UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP LLC, Plaintiff, v. ARCHITECTURAL LIGHTING SYSTEMS a division of ARCH LIGHTING GROUP, Defendant.	Civil Action No. 05-CV-10945 REK

GENLYTE THOMAS GROUP LLC'S REBUTTAL "MARKMAN" STATEMENT

I. INTRODUCTION

Defendant, Arch Lighting Group, Inc.'s ("ALS"), Markman Statement ("ALS' Statement") is fundamentally flawed in that it urges the Court to overlook well-settled principles of claim construction. Particularly, ALS' Statement attempts, contrary to Federal Circuit precedent, to change the scope of the claims of the '254 Patent. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) ("It is a 'bedrock principle' of patent law that 'the claims of a patent define the invention to which the patentee is entitled the right to exclude'"); *Scripps Clinic & Research Found. v. Genentech, Inc.*, 927 F.2d 1565, 1580 (Fed. Cir. 1991) (The function of claim construction is to "understand and explain" the claim language, "not to change the scope of the claims"). ALS' attempt to narrow the scope of the '254 Patent must fail.

Most notably, ALS makes a quantum leap in its proposed claim construction by arguing that the claimed phrase "oriented to direct light" should be interpreted to "require the highest intensity light to be aimed in the recited direction to the recited target." (ALS' Statement, p. 7). Nothing about the words "oriented to direct light" require them to be construed such that the claim requires a certain amount or "higher intensity" of light to be directed in any one direction. Similarly, the '254 Patent is devoid of ALS' concept that "oriented to direct light" means that the

light is "aimed" at a "target." The light fixtures of the integrated medical light system of the '254 Patent are not flashlights or spotlights as ALS suggests.

The Federal Circuit consistently rejects such attempts to narrow patent claims, holding that a term cannot be construed to contain modifiers or descriptors (i.e., "higher intensity," "aimed" or "target") if the claim itself does not expressly contain the modifier or descriptor. *See e.g., Northern Telecom Ltd. V. Samsung Elec. Co., Ltd.,* 215 F.3d 1281, 1290 (Fed. Cir. 2000) ("This court has repeatedly and clearly held that it will not read unstated limitations into claim language.") Consequently, ALS' attempt to rewrite the claims "to require the highest intensity light to be aimed in the recited direction to the recited target" must fail. Instead, the term is properly construed to mean that the fixture is "set or arranged to direct" light.

In addition, ALS' discussion of the claim term "means for ceiling-mounting said body" ignores what the '254 Patent conveys to one skilled in the art. ALS wholly fails to address the specification of the '254 Patent from the perspective of one skilled in the art, a critical error. Consequently, ALS' assertion that the Court will be "unable to provide a complete interpretation of this element" must also be rejected. (ALS' Statement, p. 6). Indeed, when viewed under the proper standard, the '254 Patent conveys to one skilled in the art the structure for performing the function of "ceiling-mounting said body," allowing this Court to fully interpret the claim term.

In this Brief, Genlyte will address those claim terms of the '254 Patent, in addition to the terms discussed above, misconstrued by ALS.

II. RESPONSE TO CLAIM TERMS MISCONSTRUED BY ALS

A. Means For Ceiling-Mounting Said Body

First, ALS misconstrues the function of this claim term. The function of this means-plus-function claim term must be given its full breadth. Second, ALS, although identifying that the issue of invalidity is not currently before the Court, makes a conclusory statement that the Court

will be "unable to provide a complete interpretation" of this claim term. (ALS' Statement, p. 6). ALS' veiled attempt to invalidate the '254 Patent must fail.

1. The proper function is "ceiling-mounting said body"

ALS first states that the function claimed is "mounting the body on the ceiling." (ALS' Statement, p. 6) (emphasis supplied). This is wrong. The function is "ceiling-mounting said body." This distinction is important because the body of the light system can be mounted on or in the ceiling. (Rebuttal Statement of Thomas M. Lemons, A Person Skilled in the Lighting Arts ("Lemons Rebuttal"), attached hereto as Exhibit 1, p. 2, ¶ 1). This is a point later recognized and admitted by ALS when its states that the "body is mounted horizontally on or in the ceiling." (ALS' Statement, p. 9) (emphasis supplied).

2. The '254 Patent is presumed valid and ALS' conclusory statements do not overcome this presumption

As the Federal Circuit mandates:

> For a court to hold that a claim containing a means-plus-function limitation lacks a disclosure of structure in the patent specification that performs the claimed function, necessarily means that the court finds the claim in question indefinite, and thus invalid. Because the claims of a patent are afforded a statutory presumption of validity, overcoming the presumption of validity requires that any facts supporting a holding of invalidity must be proved by clear and convincing evidence.

Budde v. Harley-Davidson, Inc., 250 F.3d 1369, 1376 (Fed. Cir. 2001) (citations omitted and emphasis supplied). To this end, ALS provides no support or evidence[1] for its position that the specification of the '254 Patent fails to provide structure for the function of "ceiling-mounting said body." Therefore, ALS' disguised attempt to invalidate the '254 Patent must fail.

[1] Interestingly, ALS provides no evidence to support its position despite having filed an expert statement. One can only guess why ALS' expert, Dr. Ian Lewin, did not address this issue or provide any material to support ALS' conclusory statement that the term "means for ceiling-mounting said body" cannot be fully interpreted.

3. The '254 Patent discloses to those skilled in the art the corresponding structure for "ceiling-mounting said body"

ALS' Statement makes no attempt to address the specification of the '254 Patent or what the specification teaches one skilled in the art as to the structure corresponding to performing the function of "ceiling-mounting said body." This is a critical error by ALS. The Federal Circuit mandates that the inquiry into whether sufficient structure has been disclosed in a patent specification to support a means-plus-function limitation should be undertaken from the perspective of one skilled in the art. *See Atmel Corp. v. Information Storage Devices, Inc.* 198 F.3d 1374, 1379 (Fed. Cir. 1999) ("As it is well-established that claims are to be construed in view of the understanding of one skilled in the art, the closely related issue concerning whether sufficient structure has in fact been disclosed to support a means-plus-function limitation should be analyzed under the same standard.") (internal citations omitted). As Genlyte's expert, Tom Lemons, pointed out in his "Statement of Thomas M. Lemons, A Person Skilled in the Lighting Arts" ("Lemons Statement") submitted with Genlyte Thomas' Opening Markman Statement ("Genlyte's Statement"), the '254 Patent disclosure specifically states that the invention is configured to "replace a conventional troffer[2]." As evidenced by Lemons, such a disclosure conveys to one skilled in the art the structure for "ceiling-mounting said body." (Lemons Statement, pp. 3-4) ("A conventional surface mounted troffer is fastened directly to a ceiling using mounting holes provided in the back surface of the body. . . [wherein a] conventional recessed troffer . . . has a flat flange around it that sits on the inside flat face surface of the [ceiling] grid.")

[2] The Illuminating Engineering Society of North America Lighting Handbook, current at the filing of the '254 Patent, defines "troffer" as "a recessed lighting unit, usually long and installed with the opening flush with the ceiling." (Exhibit B to the Lemons Rebuttal).

As further explained by Lemons in the Lemons Rebuttal, a "conventional troffer" has been known in the lighting industry for at least 50 years and, therefore, those skilled in the art understand how such "troffers" are mounted on, or into, a ceiling and know the structure of a "troffer" for doing so. (Lemons Rebuttal, p. 2, ¶ 1). Consequently, one skilled in the art "immediately" understands how the device of the '254 Patent is ceiling-mounted and what structure is required. *Id.* Specifically, one skilled in the art knows that a "conventional troffer" has (1) a lip or flange which lies on a lip around an opening in a grid ceiling, or (2) mounting holes for mounting to a ceiling. (Lemons Rebuttal, p. 2, ¶ 1). As the Federal Circuit held in *Atmel,* 198 F.3d at 1382, "[t]he knowledge of one skilled in the particular art may be used to understand what structure(s) the specification discloses. . . ."

Therefore, the disclosure in the '254 Patent specification is fully sufficient to meet the requirements of 35 U.S.C. §112, ¶¶ 2 and 6. *See Budde*, 250 F.3d at 1382 (specification's reference to a "commercially available" vacuum sensor was sufficient structure because such was well known in the art and one skilled in the art would understand such as capable of performing the claimed function); *see also Atmel*, 198 F.3d at 1382 ("[I]n order for a claim to meet the particularity requirement of ¶ 2, the corresponding structure(s) of a means-plus-function limitation must be disclosed in the written description in such a manner that one skilled in the art will know and understand what structure corresponds to the means limitation;" "The specification would be of enormous and unnecessary length if one had to literally reinvent and describe the wheel."); *S3 Inc. v. Nvidia Corp.*, 259 F.3d 1364, 1370 (Fed. Cir. 2001) (specification's reference to a "selector" was sufficient because such term was understood by one skilled in the art to be well known structure); *Baker Hughes, Inc. v. Davis Lynch, Inc.*, 31 Fed.Appx. 650, 654 (Fed. Cir. 2002) (unpublished) (attached hereto as Exhibit 2 (holding that

"under our caselaw interpreting section 112 ¶ 6, knowledge of one skilled in the art can be called upon to flesh out a particular structural reference in the specification for the purpose of meeting the statutory requirement of definiteness). Therefore, "means for ceiling-mounting said body" can be fully interpreted as set forth in Genlyte's Statement. (Genlyte's Statement, p. 12).

B. Oriented To Direct Light

ALS relies solely on extrinsic evidence in an attempt to narrowly construe the term "oriented to direct light" as meaning a "higher intensity of light to be aimed in the recited direction to the recited target." (ALS' Statement, p. 7). The reason ALS relies on extrinsic evidence in an attempt to import this concept is because the '254 Patent does not support the notion that the term "oriented to direct light" requires the fixture to emanate a "higher intensity" of light in one direction than any other. Although the '254 Patent describes and claims light being sent in certain directions, it does not require a "higher" or "lower," or any other level, of intensity of light to be directed in that or any direction. The Federal Circuit has repeatedly held, most recently in *Phillips,* 415 F.3d at 1312, that importing limitations into the claims is a fundamental error in claim construction. Therefore, ALS' attempt must fail.

The '254 Patent specification lacks any reference to, or support for, ALS' contention that the light must be "aimed." In fact, the specification teaches that the "downwardly" light from the reading fixture of the preferred embodiment will be sent to "an area appropriate for a patient reading in bed," a "forward portion of the patient's bed," or a "reading area." (Exhibit 1 to Genlyte's Statement, Col. 1, Lines 45-47; Col. 2, Lines 4-5 and 45-46; Lemons Rebuttal, pp. 2-3). Likewise, the specification teaches that the "downwardly" light from the examination fixture of the preferred embodiment will be sent to "the entire area of the patient's bed." (Exhibit 1 to Genlyte's Statement, Col. 2, Line 49; Col. 2, Lines 15-16; Col. 3, Lines 6-7). To provide light over an "area" as described above, common sense dictates that the fixture does not focus or

"aim" the light, but instead sends or "directs" light to these areas. (Lemons Rebuttal, pp. 2-3, ¶ 2; pp. 4-5, ¶ 7).

Lewin's statement that the term "'direct' has a specific meaning, and refers to the purposeful directing of the highest intensity of light towards a target" is unsupported by the '254 Patent specification and should be disregarded. The fixtures of the '254 Patent are not analogous to spotlights or flashlights as Lewin suggests. (Statement of Ian Lewin, attached to ALS' Statement as Exhibit 2 ("Lewin Statement"), p. 2). As Lemons explains:

> There is nothing in the patent that identifies that any of the three fixtures produce "flashlight" or even "spotlight" beams of light. Even the reading light is said in Column 2 [of the '254 Patent] starting at line 4 "to direct light to the forward portion of the patient's bed" and therefore an area much bigger than the area illuminated by a "flashlight" or "spotlight". Therefore it is incorrect to conclude that there is a specific "target" where "the majority of the light" or "the part having the highest intensity" is directed.

(Lemons Rebuttal, p. 3, ¶ 2). Lewin provides no support for his statement that the term "direct" has a "specific meaning." Lewin only provides a "flashlight" analogy that is irrelevant to the '254 Patent and its teachings. Consequently, ALS' construction of the term "oriented to direct light" should be disregarded. *Phillips*, 415 F.3d at 1318 ("conclusory, unsupported assertions by experts as to the definition of a claim term are not useful to a court.")

In *Dayco Products, Inc. v. Total Containment, Inc.*, 258 F.3d 1317 (Fed. Cir. 2001) the claim at issue required an insert to be "received in" a recess. The District Court construed the term "received in" to require that the insert be "completely received in" the recess. *Id.* at 1325 (emphasis supplied). In rejecting the District Court's construction, the Federal Circuit held that the patentees did not unambiguously limit the scope of the claim by requiring the insert to be "completely" received, and to construe the term to require such a limitation was to

"impermissibly read an unclaimed (and arguably undisclosed) limitation into the claims." *Id.* at 1325. Similarly, ALS' attempt to construe the term "oriented to direct" to require "unclaimed" limitations (i.e., a "higher intensity" of light to be "aimed") must be rejected. As previously pointed out, to persons skilled in the lighting art, the term "oriented to direct light" does not require reference to any level of intensity of light emitted in any one direction. As set forth in Genlyte's Statement, the meaning of such terms is properly construed to mean to "set or arrange to direct illumination." (Genlyte's Statement, pp. 12-13).

C. Downwardly

ALS' proposed construction of this claim term is ambiguous and contradicts the teachings of the '254 Patent. ALS first states that "[t]he ordinary meaning, decending [*sic*] from a source (Webster), can be used for this term," but then states, "[d]ownwardly means that light is aimed below the first fixture." (ALS' Statement, pp. 7-8). ALS' recognition of an "ordinary meaning" followed by its suggestion to import an additional limitation (i.e., "aim"), highlights ALS' unwarranted attempt to narrowly construe the '254 Patent.

There can be no dispute that the term "downwardly" means "a direction below the light system." As previously discussed in Genlyte's Statement, the '254 Patent specification describes the preferred embodiment as a light system having a first and third light fixture over the patient bed that send light to an area below the bed (i.e., the reading area or the patient examination area). Consequently, light from the first and third light fixtures is directed "downwardly" or in "a direction below the light system." (Genlyte's Statement, pp. 13-14).

D. A Selected Reading Area

Oddly, ALS contends that the term "a selected reading area" has no ordinary or customary meaning. (ALS' Statement, p. 8). In so stating, ALS asserts that "the specification must be used in determining the meaning of this term." (ALS' Statement, p. 8). Such a statement suggests that ALS is either again ignoring principles of claim construction or simply confused as to the proper application of such principles.

The words of a claim are generally given their ordinary and customary meaning as understood by one of skill in the art at the time of the invention. This inquiry into how one skilled in the art understands the claim terms is the starting point for claim construction. *Phillips*, 415 F.3d at 1312-13. When making such a determination, those skilled in the art are "deemed to read the claim term not only in the context of the particular claim in which the disputed term appears, but in the context of the entire patent, including the specification." *Phillips*, 415 F.3d at 1313. Consequently, the specification always plays a role in claim construction and is not simply put into play, as ALS suggests, if a term has no "ordinary or customary" meaning.

Moreover, the Federal Circuit instructs that "the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips*, 415 F.3d at 1314 (citing *Brown v. 3M*, 265 F.3d 1349, 1352 (Fed. Cir. 2001) ("claims did 'not require elaborate interpretation'")). Such is true here. The term "a selected reading area" is commonly understood and should not require "elaborate interpretation."

Indeed, contrary to ALS contention, the term "a selected reading area" has an ordinary meaning as disclosed in the patent. The '254 Patent specification teaches that the reading area is

"an area appropriate for a patient reading in bed." (Exhibit 1 to Genlyte's Statement, Col. 1, Lines 46-47). Based on this, Lemons states that the term means "a zone where a patient reads material." (Lemons Statement, p. 5).

Thus, there is no support for ALS' contention that "a selected reading area" must be construed to contain the modifier "defined area." (ALS' Statement, p. 8; *see* Lemons Rebuttal, p. 3, ¶ 3). Instead, the proper construction of such term is "an area below the light system in which a person may read." (Genlyte's Statement, pp. 14-15).

E. Downwardly And Outwardly

ALS contends that the term "downwardly and outwardly" refers to a "single direction" "which is below, yet outside the area of the body" of the light fixture. (ALS' Statement, pp. 8-9; Lewin Statement, p. 3). This is yet another attempt to import ALS' notion that the light fixtures of the '254 Patent "aim" their light like flashlights or spotlights. ALS' construction should be disregarded.

1. The light fixtures of the '254 Patent are NOT flashlights or spotlights

Contrary to ALS' assertions (and Lewin's statements), the light fixtures of the '254 Patent do not emit light that travels in a single, well-defined beam of light such as that produced by a flashlight or spotlight. The '254 Patent does not discuss or claim a flashlight or spotlight in its "second light fixture" or anywhere else. Light from the lamps of a light fixture has a three-dimensional distribution, which can go downwardly, outwardly and/or upwardly. (Lemons Rebuttal, p. 3, ¶ 2; p. 5, ¶ 7). In other words, light is emitted, not as a defined, single-directional beam, but in a multitude of directions resulting in a three-dimensional volume of light being distributed. *Id.* Consequently, light emitted "downwardly and outwardly" is a three-dimensional

volume of light having a downward and outward[3] direction of travel. Therefore, in the context of the claims of the '254 Patent, such a limitation reveals that when the lighting system is installed adjacent to a vertical wall, light will impact the vertical wall because of the outward component of the three-dimensional volume of light being emitted. (Lemons Rebuttal, pp. 3-4, ¶ 4; p. 5, ¶ 10). Nonetheless, because light from the fixtures of the '254 Patent is emitted in a three-dimensional cone of energy, downward light will also impact the bed without first impacting the vertical wall. *Id.*

2. The claims do not require the light to be "aimed" in a "single direction"

In fact, there is no limitation in the claims of the '254 Patent which necessarily excludes light from the "second light fixture" from reaching the area under the lighting system without first reflecting off of the vertical wall. (Lemons Rebuttal, p. 3, ¶ 4). ALS' attempts to import into the claims the limitations that the light must be "aimed" in a "single direction" should be rejected. *See, Dayco Products, Inc. v. Total Containment, Inc.*, 258 F.3d 1317, 1325 (Fed. Cir. 2001); *Renishaw PLC v. Marposs Societa' Per Azioni*, 158 F.3d 1243, 1248-50 (Fed. Cir. 1998).

3. ALS, through Lewin, misrepresents what the '254 Patent teaches

Similar to his contentions regarding the term "oriented to direct light," Lewin states that the term "downwardly and outwardly" is understood to mean that the "second light fixture . . . necessitates higher intensity in directions toward an end wall than towards the bed." (Lewin Statement, p. 4). Nowhere in the '254 Patent does it state, or suggest to one skilled in the art, that the "second light fixture" must only reflect light off of, or direct the "highest intensity" of light toward, the vertical wall. (Lemons Rebuttal, pp. 3-4, ¶ 4; p. 5, ¶ 10).

[3] As opposed to, for example, a three-dimensional volume of light with upward and outward components, or downward, outward and upward components.

Lewin attempts to support his statements by citing to the '254 Patent specification. (Lewin Statement, p. 3). The specification, however, does not support Lewin. The specification, as pointed out by Lewin, states: ". . . so as to reflect or bounce light from wall 300 thereby providing ambient light to bed 200." As can be seen, this statement from the specification does not require a "higher intensity" (or any other intensity) of light to strike the wall – it merely states that some light will reflect from the wall. Further, Lewin's reliance on that portion of the '254 Patent specification which states that the fixture components "are configured so as not to direct glare toward the head of the bed 200 where the patient's head is likely to be" is misplaced. Glare, as will be discussed below, is based upon the level of light a viewer's eyes are adapted to and placing a "higher intensity" of light or bright spot on the vertical wall, as Lewin suggests, may, in fact, cause glare. (Lemons Rebuttal, p. 5, ¶ 10). Therefore, Lewin's "support" from the specification of the '254 Patent does not aid ALS in its attempt to narrow the scope of the claims.

4. "Downwardly and outwardly" should be given its "ordinary and customary" meaning

As discussed at page 6 of Genlyte's Statement, the Federal Circuit has held that there is a "heavy presumption" that claim terms carry their "ordinary and customary" meaning. *See, e.g., CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1366 (Fed. Cir. 2002); *Phillips*, 415 F.3d at 1312 ("We have frequently stated that the words of a claim 'are generally given their ordinary and customary meaning.'")

In the context of the '254 Patent, and as supported by Lemons, the ordinary meaning of the claim term "downwardly and outwardly" means "a direction below and away from the center of the light fixture." (Genlyte's Statement, pp. 15-16).

F. A Vertical Wall Surface Outwardly Adjacent From Said Body

Genlyte did not address this term in its opening brief as it was not identified by ALS as being a term in dispute until it was addressed in ALS' Statement. Nonetheless, there is nothing complex about this claim language and Genlyte agrees with ALS that "outwardly adjacent" means "next to or near." (ALS' Statement, p. 9). However, Genlyte disputes ALS' contention that the vertical wall must be next to or near a body "mounted on" the ceiling. As ALS itself has stated, the "body is mounted horizontally on or in the ceiling." (ALS' Statement, p. 9) (emphasis supplied). Consequently, the definition of this claim term should not include a limitation that the body be ceiling-mounted in any certain manner. The plain language of this claim element does not contain such a limitation. This claim term is properly construed to mean "a vertical wall surface next to or near said body."

G. Reflected Back To A Broad Area

ALS' construction of the claim term "reflected back to a broad area" is another attempt to convince this Court that the "second light fixture" of the claims of the '254 Patent must "aim" its light at the vertical wall. ALS contends that "[l]ight from the second fixture is aimed at a wall so that it is reflected back off the wall." (ALS' Statement, p. 9). As shown above, the '254 Patent is void of the notation that the "second light fixture" must "aim" its light to the vertical wall.

Moreover, although ALS correctly identifies the "broad area" as a "large area", ALS concludes that the "broad area" is "around the patient's bed." (ALS' Statement, p. 9). ALS again imports a limitation not found in the claims. The claim simply states "reflected back to a broad area under said body." (Exhibit 1 to Genlyte's Statement, Col. 3, Lines 46-47 and 63-64). Thus, the claim term is properly construed to mean that the light is "reflected back" or "redirected" to a "large area under said body." (Genlyte's Statement, pp. 16-17).

H. Reflector

ALS' construction of the claim term "reflector" is yet another attempt to convince this Court that the claims of the '254 Patent require a "higher intensity" of light to be directed either "downwardly" or "downwardly and outwardly." (ALS' Statement, p. 11). In doing so, ALS argues that the term "reflector" must be construed to include only specular or semi-specular reflectors. (ALS' Statement, pp. 11-12). However, in order to make such an argument, ALS ignores the ordinary and customary meaning of "reflector" and unjustly imports limitations into the claims.

The only support for ALS' position is reliance on its own argument that the fixtures claimed in the '254 Patent are required to "aim" a "high intensity" of light toward a defined "target." (ALS' Statement, p. 11; Lewin Statement, p. 6). However, ALS' argument is based on a flawed understanding of light distribution from reflectors. As explained by Lemons, there is no basis for ALS (or Lewin) to conclude that specular or semi-specular reflectors will produce better light control than other types of reflectors such as white-painted (i.e., diffuse) reflectors. (Lemons Rebuttal, p. 4, ¶ 5; p. 6, ¶ 13).

Regardless, ALS' position is contradictory to what is stated in the '254 Patent and defies the principles of claim construction. Nowhere does the '254 Patent limit the "reflectors" of the invention disclosed or claimed to "specular" or "semi-specular" reflectors. In fact, the '254 Patent does not mention any specific type of reflector. The '254 Patent only teaches that the fixtures contain "reflectors." (Exhibit 1 to Genlyte's Statement, Col. 2, Lines 4, 7, 42, 47, 50, 55, 58, 61 and 66). ALS even identifies the broadness of the term "reflector" by stating that it "is a known structure in a lighting fixture which causes light to be distributed or directed." (ALS' Statement, p. 11). Despite this concession, however, ALS attempts to import the additional limitations or modifiers "specular" or "semi-specular" into the claims. This attempt must fail.

The Federal Circuit mandates that "if an apparatus claim recites a general structure (e.g., noun) without limiting that structure to a specific subset of structures (e.g., with an adjective), we will generally construe the claim to cover all known types of that structure that are supported by the patent disclosure." *Renishaw*, 158 F.3d at 1250 (citing *Sjolund v. Musland*, 847 F.2d 1573, 1581-82 (Fed. Cir. 1988) (refusing to limit claim term "baffle" to only rigid baffles and term "panel" to only panels of lattice construction)) (other citations omitted).

Moreover, the '254 Patent embraces other types of reflectors (i.e., diffuse reflectors) than those identified by ALS by teaching in the preferred embodiment the desire to reduce glare. Lemons points out that diffuse (e.g., white-painted) reflectors accomplish this reduction of glare by acting as large areas having uniform brightness. (Lemons Rebuttal, p. 4, ¶ 5; p. 6, ¶ 13).

In light of the above, the term "reflector" should be construed to be given its ordinary and full meaning: "a device that redirects light." (Genlyte's Statement, p. 18). *See, Johnson Worldwide Assoc., Inc. v. Zebco Corp.*, 175 F.3d 985, 989 (Fed. Cir. 1999) (holding that "[g]eneral descriptive terms will ordinarily be given their full meaning; modifiers will not be added to broad terms standing alone" and "[i]n short, a court must presume that the terms in the claim mean what they say, and, unless otherwise compelled, give full effect to the ordinary and accustomed meaning of claim terms").

I. Fluorescent Assembly

Like many of ALS' other proposed constructions, ALS proposes a construction for "fluorescent assembly" based on what ALS wishes the term to mean rather than what the term means to one skilled in the art in light of the '254 Patent. ALS asserts that the term "includes one or more bulbs within a single reflector." (ALS' Statement, p. 12).

There is no support for ALS' contention that the "fluorescent assembly" include a single reflector or a reflector at all. In fact, ALS' construction is contrary to the claim terms

themselves. Claim 4 of the '254 Patent claims a third light fixture that "includes a third reflector and a fluorescent assembly therewithin." (Exhibit 1 to Genlyte's Statement, Col. 4, Lines 8-9). In other words, the "reflector" is separate structure from the "fluorescent assembly" and, therefore, not included within the "fluorescent assembly." To accept ALS' definition would again require this Court to ignore certain claim construction principles. The Federal Circuit has rejected a construction of a claim term (such as proposed by ALS) that renders another claim term redundant. *See, Unique Concepts, Inc. v. Brown*, 939 F.2d 1558, 1561-62 (Fed. Cir. 1991).

Moreover, the claim term is a "fluorescent" assembly, which specifically refers to the fluorescent lamps or bulbs. Consequently, as set forth in Genlyte's Statement, the term "fluorescent assembly" is properly construed to mean a "unit of lamps and sockets." (Genlyte's Statement, p. 19).

J. Light Distribution Pattern

In its proposed construction of this claim term, ALS makes the conclusory statement that "light distribution pattern is a term of art within the lighting industry which means the direction where the major intensity of the light from the bulb is directed." (ALS' Statement, p. 12; Lewin Statement, p. 6). ALS provides absolutely no support for its proposed construction, nor can it. ALS' proposed construction is simply a way to maintain its mantra of narrowing the scope of the '254 Patent by importing into the claims its "higher intensity of light aimed at a target" concept.

A "light distribution pattern" is just that -- the distribution pattern of light emitted from a lamp. The term "light distribution pattern" says nothing about a direction or where the "major intensity" of light is directed. As Lemons explains, a lamp (such as a biax fluorescent lamp which is disclosed in the preferred embodiment of the '254 Patent) produces light in all directions except through the socket end of the lamp and the pattern of light that the lamp produces has a great range of intensities. (Lemons Rebuttal, pp. 6-7, ¶ 14). In other words, the

"pattern" embraces all of the light being emitted (not just the "major intensity" of light) and different areas of this pattern will have different intensities of light.

In keeping with the claim term itself, and as set forth in Genlyte's Statement, "light distribution pattern" is properly construed to mean "the pattern of light emitted from a fluorescent lamp." (Genlyte's Statement, p. 19).

K. Glare

ALS' construction of the term "glare" is inaccurate because it implies that "glare" requires a certain level of illuminance without regard to the amount of light the eyes are adapted to. Whether or not a light fixture produces glare, however, is dependent upon what level of light the eyes of the viewer are adapted to when viewing the light fixture. (Genlyte's Statement, pp. 19-20). For example, a fixture which produces a very low level of illuminance may still be a source for glare if the viewer was previously in a dark room. To further illustrate the point, consider a car headlight. When viewing the headlights of a car during the day (when the eyes are adapted to the sunlight) the headlights are not glare sources, but when viewing the same headlights at night (when the eyes are adapted to a very low level of light), the headlights are glare sources. (Lemons Rebuttal, p. 4, ¶ 6).

In light of the above, ALS' inaccurate construction of the term "glare" should be rejected. As set forth in Genlyte's Statement, the term "glare" is properly construed to mean "the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted to cause annoyance, discomfort or loss in visual performance and visibility." (Genlyte's Statement, pp. 19-20).

III. RESPONSE TO LEWIN'S DISCUSSION OF PRIOR ART PATENTS

Although not addressed in ALS' Statement, Lewin dedicates a large portion of his statement to discussing two prior art patents and implies that such patents would invalidate

claims 1 and 3 of the '254 Patent if the "second light fixture" element of said claims is given a broader interpretation than that proposed by ALS. (Lewin Statement, pp. 6-10). This is a red herring. The claims of the '254 Patent, as properly construed by Genlyte, are valid over the prior art cited by Lewin.

Lewin suggests that if the Court does not accept ALS' claim construction claims 1 and 3 of the '254 Patent would be "preceded" by U.S. Patent Nos. 2,557,129 ("the '129 Patent") and 4,816,969 ("the '969 Patent"). (Lewin Statement, 6-10). It cannot be legitimately disputed, however, that the "prior art" fails to provide all of the elements and limitations of a properly construed claim 1 (and claim 3 since it contains all the limitations of claim 1). Therefore, the "prior art" does not require this Court to accept ALS' unwarranted, narrow construction of the claims.

The '129 Patent is for a "spotlighting unit" that is capable of being attached to a ceiling type fixture. ('129 Patent, Exhibit C to Lewin Statement, Col. 1, Lines 1-6). The '969 Patent is for a "wall-mounted" light fixture for illuminating a patient bed. ('969 Patent, Exhibit D to Lewin Statement, Col. 1, Lines 7-13).

As can be seen by comparing claim 1, as properly construed by Genlyte, to the above "prior art" fixtures, such fixtures do not contain, as indicated below, at least the following claim elements:

- A means for ceiling-mounting said body. Claim 1, as properly construed by Genlyte, requires, per a conventional troffer, a "flange or mounting holes" for ceiling-mounting said body. The '969 Patent discloses a "wall-mounted" fixture and, consequently, fails to suggest any means for ceiling-mounting the fixture. In fact, as a "wall-mount" fixture, the '969 Patent teaches away from the concept of ceiling-mounting the fixture or constructing the fixture to replace a conventional troffer. ('969 Patent; Lemons Rebuttal, p. 7, ¶ 15).
- A first light fixture and a second light fixture within said body. Claim 1 requires a "body," a "first light fixture within said body," and a "second light fixture within said body." The '129 Patent describes a "spotlight" attached to a ceiling-fixture.

Consequently, the '129 Patent does not contain two fixtures within a body as required by claim 1. ('129 Patent; Lemons Rebuttal, p. 7, ¶ 15).

- Light directed to a reading area. Claim 1, as properly construed by Genlyte, requires a "first light fixture . . . set or arranged" to direct light to "an area below the light system in which a person may read." The '129 Patent fails to suggest using the "spotlight" unit for reading. The '129 Patent teaches that its invention can be used to accomplish the "spotlighting requirements of the establishment." ('129 Patent, Col. 2, Lines 19-20). As understood by one skilled in the art, such spotlighting is not a suitable light for reading. (Lemons Rebuttal, p. 7, ¶ 15).
- Light directed downwardly and outwardly. Claim 1, as properly construed by Genlyte, requires a "second light fixture . . . set or arranged" to direct light "below and away from the light system." Neither the '129 Patent nor the '969 Patent suggest directing light "below and away from the light system." As stated above, the '129 Patent discloses a "spotlight" which may be attached to a ceiling type fixture. However, the '129 Patent does not teach the directionality of the light produced by either the "spotlight" or the "ceiling type fixture." Further, as stated above, the '969 Patent teaches a "wall-mounted" fixture and fails to suggest light being directed "below and away from the light system" as taught in the '254 Patent. ('129 Patent and '969 Patent).
- Light directed to a vertical wall outwardly adjacent from said body. Claim 1, as properly construed by Genlyte, also requires a "second light fixture . . . set or arranged" to direct light "to a vertical wall surface next to or near" said body. Again, neither the '129 Patent nor the '969 Patent suggest directing light to a vertical wall surface. In fact, the '969 Patent, as a "wall mount" fixture, teaches away from directing light to a vertical wall. ('129 Patent and '969 Patent).
- Whereby light is reflected back to a broad area under said body. Claim 1, as properly construed by Genlyte, also requires the light falling on the vertical wall surface to be "redirected to a large area under said body." Because neither the '129 Patent nor the '969 Patent suggest directing light to a vertical wall they likewise fail to suggest the light being redirected back to a large area under the light system. ('129 patent and '969 Patent).

In *Scripps, supra,* 927 F.2d at 1576 (citations omitted and emphasis supplied), the Federal Circuit held:

> Invalidity for anticipation requires that all of the elements and limitations of the claim are found within a single prior art reference. There must be **no** difference between the claimed invention and the reference disclosure, as viewed by a person of ordinary skill in the field of the invention.

In light of this Federal Circuit precedent, Lewin's suggestion that a broader interpretation of the claims of the '254 Patent than that proposed by ALS would render the claims invalid is baseless. As seen above, many elements of claim 1 are absent from the "prior art" cited by ALS. In fact,

the '969 Patent discloses a "wall-mounted" fixture, which teaches away from one of the basic elements of the '254 Patent – a ceiling-mounted fixture. (Lemons Rebuttal, pp. 7-8, ¶ 15). Additionally, the '129 Patent discloses nothing but a specific construction for a "spotlight" that is capable of being attached to another light fixture. It is an understatement to say that there are substantial differences between the "prior art" addressed by Lewin and claim 1 (or claim 3) of the '254 Patent. And, Lewin's unfounded, conclusory statements that the elements of claims 1 and 3 of the '254 Patent are found in the prior art are insufficient to support ALS' narrow claim construction. *See NTP, Inc. v. Research In Motion, LTD*, 418 F.3d 1282, 1325 (Fed. Cir. 2005) (agreeing with district court that conclusory expert testimony is hardly enough to meet the high burden of showing clear and convincing evidence with respect to invalidity). Therefore, the "prior art" fails to support ALS' unwarranted, narrow construction of the claim terms.

IV. CONCLUSION

ALS' Statement attempts to narrow the scope of the claims of the '254 Patent, rather than construe them. ALS urges this Court to ignore the ordinary and customary meaning of the claim terms at issue, and add terms to the claims (such as "higher intensity," "aim," and "target") that are not recited in the claims. As the Federal Circuit has repeatedly held, this is improper. Genlyte asserts that its proposed claim construction of the disputed terms of the '254 Patent should be adopted because it is based on the ordinary meaning of the words actually in the claims and as understood by a person skilled in the lighting art.

Respectfully submitted,

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Certificate of Service

I hereby certify that this document(s) filed through the ECF system will be sent electronically to the registered participants as identified on the Notice of Electronic Filing (NEF) and paper copies will be sent to those indicated as non-registered participants on this 5th day of June, 2006.

/s/ John L. Capone
Counsel for Plaintiff, Genlyte Thomas Group LLC

EXHIBIT 1

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP LLC A Delaware Limited Liability Company Plaintiff, v. ARCHITECTURAL LIGHTING SYSTEMS a division of ARCH LIGHTING GROUP a Rhode Island Corporation Defendant	)	Civil Action No. 05-CV-10945 REK

REBUTTAL
STATEMENT OF THOMAS M. LEMONS

INTRODUCTION

I have been asked by the Attorney for the Plaintiff to review and comment on the Architectural Lighting Systems (ALS) "Markman" Statement dated May 17, 2006.

QUALIFICATIONS

My qualifications have been previously detailed in my statement of May 18, 2006. My rate of compensation paid by Genlyte for my services is $140 per hour and I have not yet received compensation for my ALS activity.

MATERIALS CONSIDERED IN FORMING MY OPINION

The materials that I considered while forming my opinion are as follows:

ALS "Markman" statement dated May 18, 2006 with attachments:
- Statement of Ian Lewin dated May 16, 2006
- U. S. Patent # 5,038,254 ('254)
- IESNA Lighting Handbook, 8th Edition, 1993, pages 463, 438, 440 & 917
- U. S. Patent # 2,557,129 ('129)
- U. S. Patent # 4,816,969 ('969)

Statement of Thomas M. Lemons dated May 18, 2006
IESNA Lighting Handbook, Reference Volume, 1984
IES Lighting Handbook, 3rd Edition, 1959

Conwed Ceiling Products, 1975 brochure
Sorcar, P. C., *Rapid Lighting Design and Cost Estimating,* McGraw-Hill Book, Co., New York, NY, 1979
Elmer, W. B., *Optical Design of Reflectors*, John Wiley and Sons, 1980, Fig. 9j, p. 29

REVIEW

1. On pages 5 and 6 of the ALS Statement (Exhibit A), under the heading "*Means for Ceiling-Mounting Said Body*" they address this phrase as a 112/6 means plus function phrase. ALS totally misses the fact that the patent at Column 1 line 5 states "preferably mounted in the ceiling." Further the '254 patent at Column 3 starting at line 12 states "lighting fixture 10 to be packaged in a two foot by four foot configuration and thereby replace a conventional troffer." The IESNA Lighting Handbook, Reference Volume, 1984 (Exhibit B; the Handbook current at the filing time of in 1990 of the '254 patent) defines "troffer" as "a recessed lighting unit, usually long and installed with the opening flush with the ceiling." This exact same definition was in the IESNA Lighting Handbook, 3rd Edition, 1959 (Exhibit C) which indicates that "troffer" has been a lighting term for at least 50 years and is therefore well understood by everyone in the lighting industry including how they mount into the ceiling. A replacement for a "conventional troffer" immediately tells a person in the lighting industry how the unit is mounted. No detailed description is required because a "troffer" lies on a lip around an opening in a grid ceiling where it replaces the acoustical tile that would otherwise lay into the openings of the ceiling grid (see Exhibit D for a typical grid ceiling). The "conventional troffer" body sizes, face lip configuration and mounting are illustrated in the book *Rapid Lighting Design and Cost Estimating* published in 1979 (Exhibit E). It illustrates sizes of 1 by 4, 2 by 2 and 2 by 4; face lip configuration of an outward bent "U" shape (Exhibit E, pp. B-2, B-16 and B-20), a vertical edge (Exhibit E, p. B-42) or an inward bent lip (Exhibit E, p. B-34) with their mounting (Exhibit E, p. B-52). The '254 patent description of Figure 2 located in Column 2, starting at line 34 states "lighting fixture 10 formed by long sides 12, 14 and short sides 16, 18. Long sides 12, 14 are typically four feet in length while short sides 16, 18 are typically two feet in length." The Figure 2 illustration shows the face view of a troffer with a vertical lip and as illustrated by Exhibit E, p. B-52, no additional elements are required for mounting a troffer into a ceiling. As illustrated by Exhibit E, p. A-38 and C-22, the surface and suspended mounting of luminaires requires holes in the body related to junction boxes and holes for suspension mounting but these are not the preferred mounting identified in the '254 patent. Therefore the ALS identification in the middle paragraph on page 6 that the "recited function is mounting the body on the ceiling" is incorrect as is their claim that the means for mounting are not identified in the '254 patent. It is true that many troffers that are 2 x 2 and 2 x 4 are also made in a second construction to allow surface mounting and therefore both recessed and surface mounting should be accepted mounting means for a '254 patent device but details for both are not required to be in the '254 patent.

2. On pages 6 and 7, under the heading 2. *Oriented to direct light* of Exhibit A, ALS uses Dr. Lewin to define "directing light". ALS states "Light from any fixture is dispersed in many directions." Dr. Lewin also uses the IESNA definition of "downward component"

when he discusses the meaning of the term "downwardly" and the meaning is "the portion of luminous flux from a luminaire emitted at angles below the horizontal." (A angular width of 180°.) Therefore the phrase "oriented to direct light" does not suggest the aiming of a flashlight as suggested by Dr. Lewin. We should therefore conclude the following:

1. Lamps and luminaires (light fixtures) produce light in many directions and not to a single point or target.

2. The distribution of light from lamps and luminaires is three-dimensional where light can go downwardly, outwardly and/or upwardly.

The issue is light being directed below the horizontal and not above the horizontal. There is nothing in the patent that identifies that any of the three fixtures produce "flashlight" or even "spotlight" beams of light. Even the reading light is said in Column 2 starting at line 4 "to direct light to the forward portion of the patient's bed" and therefore an area much bigger than the area illuminated by a "flashlight" or "spotlight". Therefore it is incorrect to conclude that there is a specific "target" where "the majority of the light" or "the part having the highest intensity" is directed. For instance, the reading light may have a maximum intensity directed to a specific location but the light in this area will be only a small portion of the total light produced by the lamps rather than the majority of the light from the lamps. Further ALS states in the middle of page 7 "If claim 1 were interpreted so as not to be limited to the highest intensity light being aimed in the direction towards the recited target, the claim would be invalid." They provide no proof of this and there is no such statement of this type in the patent with the exception of the need to direct light downwardly and not upwardly.

3. On page 8, under the headings 4. *A Selected Reading Area* and 5. *Second Light Fixture – Oriented to Direct Light* of Exhibit A, ALS again uses Lewin to define these two phrases to mean "the majority of light or the highest intensity light is aimed in a given direction." As noted above, the reading area will not have the majority of the light and there is no specific point on a bed were a patient reads so there can be no specific point or direction for aiming the highest intensity. The patent only states that this is "downwardly to a selected reading area under said body" at Column 3, line 41 and 42. Lewin's meaning should therefore not be accepted.

4. On pages 8 and 9, under the heading 6. *Downwardly and outwardly* of Exhibit A, ALS again wants to limit the meaning of this claim. I suggest that the claim can be read to state "a second light fixture within said body oriented to direct light downwardly (to a broad area under said body) and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body." This reading says the light is directed to both the area under the body as well as to the wall adjacent to the body. There is no statement anywhere in the patent which states that only the wall should be illuminated and no light should be directed elsewhere. Further, there is no statement in the patent that there is a maximum intensity of light from any fixture and that it or a majority of light is directed to a specific point. I would also note that these requirements are almost impossible to accomplish using the long linear Biax lamp. In fact in Column 2, starting a line 58 it is recognized that light is going directly down onto the bed and to areas beside the bed by stating "Reflectors 20, 24 and bulbs 22, 26 are

configured so as not to direct glare toward the head of bed 200 where the patient's head is likely to be…and…not to direct glare to areas adjacent to bed 200". The light distribution of the "second light fixture" of the '254 patent is stated to be "downwardly and outwardly". Persons skilled in the lighting art understand this to mean that some light will necessarily be directed from the luminaire to a wall surface outwardly adjacent to the fixture. Therefore the ALS position supported by Dr. Lewin is that there is only one direction for the light which is both downward and outward to the adjacent wall and I believe that this is an attempt to narrow the actual meaning of the claim and their proposed meaning is not supported by the information in the patent.

5. On pages 11 and 12, under the heading 1. *Reflector* of Exhibit A, ALS, using incorrect information from Dr. Lewin, tries to again limit the patent claims. Dr. Lewin states that the reflector material must be "specular or semi-specular" material to obtain beam control of the directed beams. The facts are that a specular or mirror image of the Biax lamp in the plane of the lamp will produce a light distribution identical to the light distribution at the lamps surface. The surface of the lamp has a lambertian distribution (defined by IESNA "a surface that emits or reflects light in accordance with Lambert's cosine law" i.e. a wide distribution, see Exhibit B). The semi-specular material will spread this wide distribution into a wider distribution. The white paint diffuse surface as shown in Figure 9j of Exhibit F, reflects light with a Lambertian distribution plus a specular source image. White painted reflectors are the most common reflector material used in troffer luminaires since they can provide over 90 % reflection and they can help control glare by becoming a large area with a uniform brightness. Therefore there is no basis to say that specular or semi-specular reflector material will, by their nature, produce better control of light than a white painted reflector and there is no reason to state that specular and semi-specular reflectors are necessary.

6. On page 12, under the heading 4. *Glare* of Exhibit A, ALS again tries to limit claims 13 and 14 by misrepresenting the meaning of glare. Glare has several factors that must be considered to understand how glare is controlled. The adaptation of the viewer's eyes is one key element. For instance, in the daytime automobile headlights are not glare sources for oncoming drivers but they can be at night when a person is dark adapted. The brightness of the source is another factor as is the area of the brightness and it location in the line of vision or off axis. A large area with uniform brightness such as the area of the luminaire and an adjacent illuminated wall can easily be considered to not be a glare source whereas a spotlight in a dark ceiling with little light on the wall (such as illustrated by U. S. Patent # 2,557,129, Exhibit C to Lewin's Statement) will be a glare source. This has nothing to do with directing the highest intensity of light to a specific target area and to have a sufficiently low intensity directed to other areas. The spotlight that easily meets these criteria will still be a glare source to a neighbors bed where the patient is looking up and over to the spotlight in the ceiling because there is a bright glow at the spotlight and the rest of the room in the field of view is dark.

7. In the statement of Ian Lewin on page 2 (Exhibit 2 to the ALS Statement (Exhibit A)), the term "*to direct light*" is defined to mean "to aim the highest intensity of light". Some beam patterns have a fairly uniform intensity of light over a range of angles such as

illustrated by luminaires # 32, # 34 and # 36 of Exhibit E to the Lewin statement; luminaires # 43 and # 48 of Exhibit F to the Lewin Statement; and luminaires # 40, # 41 and # 42 of Exhibit G to the Lewin statement. Lewin does not address how it is possible to "aim" a luminaire where the highest intensity ranges over a wide range of angles. In fact, one skilled in the art understands that spotlights and flashlights are aimed at a point but wide beams are only directed in general directions such as downward, outward or upward. Also when beams are directed to limit light beyond a given angle such as no up light or light above 90°, the luminaire is directed by the angle where there is no light beyond that angle and not by where the maximum intensity occurs. Lewin's meaning should not be accepted because there is nothing in the patent to suggest such a need for aiming the light fixtures and the acceptance of this meaning narrows the meaning of the claims.

8. In the statement of Ian Lewin on page 2 (Exhibit 2 to the ALS Statement (Exhibit A)), the term "*downwardly*" is defined using the phrase "downward component" from the IESNA Glossary of Lighting Terminology in the IESNA Lighting Handbook, 8th Edition published in 1993. I would note that this is an incorrect reference for a 1990 filed patent and though the definition did not change, the correct reference should be the IESNA Lighting Handbook, Refernenc Volume, 1984.

9. Lewin's statements starting on page 2 (Exhibit 2 to the ALS Statement (Exhibit A)) related to the term "*to a select reading area on or above the bed*" provides a strange meaning for the term. It says "to a reading area on or above the bed" which identifies that there is a very large area where Lewin states the maximum intensity should be aimed versus his "*purposeful directing of the highest intensity of light towards a target*". Again we see that his definitions are an attempt to limit the meaning of claims without having a basis for the limitation and therefore his meaning should not be accepted.

10. On page 3 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin defines the term "*downwardly and outwardly to a vertical wall surface*" to mean "a single direction below and outwards from the fixture so as to illuminate a vertical wall surface". As indicated in paragraph 4 above, this meaning has no basis for support within the patent which in fact identifies that the wall, bed and area beside the bed will be illuminated and not just the wall. Again this single direction meaning is only proposed to limit the meaning of the claim with no evidence from the patent that such a narrow meaning is justified. The paragraph that starts at the bottom of page 3 and ends at the top at page 4 also contains erroneous information. First, the intensity of light directed onto the wall must be properly controlled since the highest intensity cannot be directed at the top of the wall but should be directed at the bottom of the wall to achieve the most uniform distribution of illumination on the wall. It is the uniformity of illumination on the wall that limits the wall from becoming a glare source since a very bright area at the top of the wall that is adjacent to the luminaire could be a source of glare. Secondly, if the wall is uniformly illuminated, this large area helps establish the viewer's adaptation which will allow more light to be directed at the eye. The patient therefore does not require only a low intensity of light. Further erroneous information is provided in the first paragraph on page 4. To achieve uniform illumination down a wall, and with the bed

located adjacent to the wall, the maximum intensity that illuminates the wall will also illuminate the head of the bed since the optics to have an absolute cutoff of light at this location is not easily achieved or required. It is the uniformity of the wall illumination that makes the results "effective". Such effective illumination is rarely "efficient" which would require that more light must be directed onto the wall than is directed to any other location. These facts are well known in the art and the suggestion by Lewin that efficient cutoff optics are required without this ever being stated in the patent is only meant to limit the meaning of the claims. The meaning provided by Lewin should therefore not be accepted.

11. On page 5 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin again suggests that the third fixture also has one selected "patient examination area". He then states that this is the "an area on or above the bed" which I would understand to be at least a 3 x 6 x 3 foot or 54 cubic foot space that I do not believe provides "a" location to direct the highest intensity of illumination. The concept of directing the highest intensity of illumination therefore again fails and Lewin's meaning should not be accepted.

12. Starting at the bullet at the middle of page 5 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin identifies "hundreds of commercial lighting products are available for general lighting or 'ambient' lighting". This fact is not in dispute but the patent was granted for a device that was unique by its "integration" of two or three specific lighting fixtures that could be similar to individual standard commercial lighting fixtures. Their "integration" into one body is only one aspect of the invention. Their "integration" is no basis for Lewin to identify reasons to limit their claim language.

13. On page 6 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin defines the term "*reflector*" without using the accepted definition provided by the IESNA which is the source he uses for other terms. He again provides a definition that would limit the meaning of the claims where the term is used in an attempt to limit their meaning. As I indicated in Paragraph 5 above, the addition of "semi-specular or specular reflector surfaces" is based on no fact or concept of the control of light identified in the patent. I do not believe that anyone skilled in the art would agree with Lewin's suggested definition as compared to the IESNA industry accepted definition which I provided in my report filed with Genlyte's Opening "Markman" Statement. The Lewin definition should not be accepted.

14. On page 6 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin again provides a claim limiting definition of the term "*a light distribution pattern*". A biax fluorescent lamp directs light in every three dimensional direction except there is no light through the socket end of the lamp. For the side that is normal to the two tubes of light, the light intensity is about twice that of the intensity of light that is normal to a side that sees only one tube. The proposed meaning ("The direction[s] where the major intensity of light is projected.") would therefore seem to suggest that only the light directed by the sides of the lamp where the two tubes produce the greatest intensity or major intensity is being considered. This definition does not recognize that the lamp's

distribution pattern includes a great range of intensity values including one direction along the lamp axis where the intensity is zero. Lewin's definition therefore cannot be accepted and the definition I proposed in my report, filed with Genlyte's Opening "Markman" Statement, should be accepted.

15. On page 7 of Lewin's Statement (Exhibit 2 to the ALS Statement (Exhibit A)), Lewin has identified two patents that he considers prior art. The first, the '129 patent, is a ceiling mounted spotlight proposed "for attachment to a suspended or ceiling type fixture". The '254 patent details the installation of two or three very specific light fixtures which are contained within a common body rather than attached to each other and none of the '254 patent fixtures are "spotlights". There is no suggestion in the '129 patent that this fixture would apply to a hospital patient room lighting. When I look at the IESNA Lighting Handbooks starting with the 3rd Edition published in 1959 through the 1987 Application Volume, I find no illustrations of ceiling mounted spotlights being used in patient room lighting. The reason for this, as I discussed in paragraph 6 above, is the glare seen by patients in adjoining beds. There have been such products proposed and installed in patient rooms but they have never been found to provide acceptable results. Ceiling mounted spotlights therefore are not an accepted means to provide the reading light, the ambient light or examination light in a hospital patient room.

The '969 patent illustrates one of the many standard wall mounted "bed" lights used in the industry prior to the introduction of Genlyte products made in accordance to the '254 patent. As identified by the IESNA Lighting Handbook, 8th Edition published in 1993, the Genlyte fixture is illustrated in Figure 17-7 (Exhibit G) as the method used to illuminate a patient room. This means that within two years of the introduction of this product, it became the standard for the industry and replaced the wall mounted bed light that was illustrated in the IESNA Lighting Handbook, Applications Volume, 1987 Figures 7-6 and 7-8, Exhibit H. A similar bed light was illustrated in the IESNA Lighting Handbook, 3rd Edition from 1959 which indicates that such a wall mounted product had been in existence for many years. The suggestion by Lewin that the '969 patent product would be an acceptable product when mounted on the ceiling is absurd. There are two lamp/reflector/lens compartments. One with fluorescent lamps 47, reflector 43 and lens 41 provides down light for reading. The second with a rotating tube to direct light from just below horizontal to almost straight up has fluorescent lamps 68, the inner surface of the half tubular housing 11 as the reflector and a lens 71. The angular rotation available will not allow it to be rotated down far enough to become a reading light and since it provides a wide beam distribution it would not direct light from the ceiling to the reading area. If this luminaire was mounted "on" the ceiling by using the angle brackets suggested by Lewin and the lens 41 changed to a bilateral lens also suggested by Lewin, light would be directed onto the wall and out into the room while limiting light down onto the bed. The light out into the room will then be a glare source for nurses, doctors and adjacent patients. The second light will direct much of its light onto the ceiling rather than providing the light needed as an "examination" or "reading" light due to the limited rotation of the tubular housing. It will also produce glare for nurses, doctors and adjacent patients. Since the junction box for this product is exposed rather that mating with the junction box in the wall for it normal installation or a ceiling junction box for normal

ceiling mounted fixture, the ceiling mounting using "a pair of L-shaped brackets" is probably not an acceptable code mounting method. For these reasons, Lewin's suggestion that this product is prior art for the '254 patent should not be accepted..

CONCLUSION

A majority of the ALS proposed meanings for the terms of the '254 patient are meanings that limit the scope of the claims and ALS has not provided a basis identified in the patent for the limitation. The basis which is provided for the limitations is that Lewin says that he represents a person skilled in the lighting arts and such a person would add these limitations. I do not find anything in the material that he has provided that indicates that he has the knowledge and experience in the medical lighting industry to claim an expertise in that lighting field. I further believe that his terms' meanings support this conclusion. Further he identifies that he cannot reverse engineer the performance of the Genlyte products illustrated by the '254 patent to understand how they perform or reverse engineer the performance of the '129 and '969 patents to understand their performance when ceiling mounted in a hospital patient room. For these reasons, I do not believe that his term meanings should be considered.

Executed this 5th day of June, 2006.

Thomas M. Lemons
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7 Pond Street, Salem, MA 01970

EXHIBIT A
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP LLC,

Plaintiff/Counterclaim Defendant,

v.

ARCHITECTURAL LIGHTING SYSTEMS, a division of ARCH LIGHTING GROUP,

Defendant/Counterclaimant.

Civil Action No. 05-CV-10945 REK

DEFENDANT'S MARKMAN STATEMENT

Pursuant to agreement of the parties and in preparation for the "Markman" hearing scheduled by the court, Defendant, Arch Lighting Group, Inc. (ALS), submits this statement setting forth the appropriate interpretation of the claims of U.S. Patent No. 5,038,254 ("the '254 patent"). A copy of the '254 patent is attached hereto as Exhibit 1.

I. BACKGROUND

Plaintiff Genlyte Thomas Group, LLC ("Genlyte") and ALS are both in the business of designing, manufacturing, marketing and selling lighting fixtures. With respect to the present action, both Genlyte and ALS sell a multifunction lighting fixture for hospital patient rooms. The lighting fixtures from both companies include separately controllable lights within the fixture to provide lighting for different needs within a hospital room. The needs relate to lighting levels at different locations in a hospital room. In particular, the fixtures provide ambient lighting to the room, lighting for a patient to read, lighting for a doctor to examine the patient, and lighting for a nurse to view a chart without disturbing the patient.

Genlyte began selling its medical lighting fixture in approximately 1991 When ALS developed its product, approximately ten years later, it was well aware of the Genlyte product and that Genlyte had various intellectual property rights relating to its products. Accordingly, ALS designed its lighting fixture so as to differ significantly from the Genlyte product while still providing the functions necessary for a hospital room light. Thus, the ALS product uses different bulbs, different bulb orientations, different reflectors, and different lenses than Genlyte's product. The differences designed into the ALS product provide different light distributions from those in Genlyte's product for each function of the lighting fixture.

The claims of the '254 patent recite the structures and light distributions found in Genlyte's product. Despite the differences between the ALS and Genlyte products, Genlyte asserted that the ALS was infringing the '254 patent. ALS denied infringement and provided one of its products to Genlyte for testing. The testing showed that all of the lights in the ALS product have a similar light distribution pattern, while the claims of the '254 patent require differently directed lights, as discussed below. Nevertheless, Genlyte maintained its clearly unsupported assertion of infringement and filed the present action.

II. LEGAL STANDARDS FOR CLAIM INTERPRETATION

Patent infringement is a two step process. First, the Court must determine the meaning of the claims. *Markman v. Westview Inst. Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995)(en banc), *aff'd* 517 U.S. 370 (1996). Second, the claims, as interpreted, are compared to the accused product to determine infringement. *Allen Eng'g Corp. v. Bartell Indus. Inc.*, 299 F.3d 1336, 1345 (Fed. Cir. 2002). The claim interpretation step is a legal question to be decided by the Court. *Markman*, 52 F.3d at 977. The claims are to interpreted on an objective basis as they would be understood by one of ordinary skill in the art at the time the invention. *Markman*, 52 F.3d at 986.

The starting point for claim construction is always the language of the claims themselves. *Renishaw PLC v. Marposs Societa' Group, Inc.*, 262 F.3d 1243, 1248 (Fed. Cir. 1988)("claim construction ... begins and ends in all cases with the actual words of the claim"). The terms in a patent claim are generally "given their ordinary and customary meaning" as understood by one of ordinary skill in the art to which the invention applies. *Phillips v. AWH Corp.*, 415 F.3d. at 1312-13; *CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, (Fed. Cir. 2002); *Vitronics Corp. v. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). "In some cases, the ordinary meaning of claim language as understood by a person of skill in the art may be readily apparent even to lay judges, and claim construction in such cases involves little more than the application of the widely accepted meaning of commonly understood words." *Phillips*, 415 F.3d at 1314 (citing *Brown v. 3M*, 265 F.3d 1349, 1352 (Fed. Cir. 2001)("the claims 'did not require elaborate interpretation'").

Although claim terms are typically interpreted consistent with their ordinary meaning, a patentee may be his or her own lexicographer and use terms in a manner different from their ordinary meaning. *Vitronics*, 90 F.3d at 1582. A patentee may also use terms which have no ordinary meaning. When doing so, the patentee must clearly state the special definition or meaning of such terms in the specification or file history of the patent. *Id.* (specification can assist interpretation "when it expressly defines terms used in the claims or when it defines terms by implication."); *Markman*, 52 F.3d at 979-80 (claims "must be read in light of the specification, of which they are part"). When interpreting such terms, the Court should limit its interpretation to defining the terms in the claim. The claims are not to be limited by the preferred embodiment or embodiments disclosed in the specification. *Elkay Manuf. Co. v. Ebco*

Manuf. Co., 192 F.3d 973, 978 (Fed. Cir. 1999) ("The general rule, of course, is that the claims of a patent are not limited to the preferred embodiment, unless by their own language.").

Extrinsic evidence –evidence other than the patent and the file history – is less relevant and reliable in interpreting the meaning of the claims. *Phillips*, 415 F.3d at 1317-18. extrinsic evidence cannot provide definitions which contradict the intrinsic evidence. 1322-23; *Vitronics*, 90 F.3d at 1584, n.6. Nevertheless, expert testimony can be useful for a variety of purposes in construing the claims. Such testimony provides the court with background on the technology and an understanding of how one of ordinary skill in the art would interpret the claims. The claim constructions set forth below are supported by the Statement of Ian Lewin (attached as Exhibit 2), as one of ordinary skill in the art of lighting design.

III. CLAIM INTERPRETATION OF THE '254 PATENT.

The '254 patent, titled Integrated Medical Light System, issued August 6, 1991. The '254 patent relates to a ceiling mounted medical lighting system including a reading light, an examination light, and an ambient light. As disclosed in the '254 patent, each light directs light to a different portion of a hospital bed for a different purpose. The reading light is directed toward a reading area on a hospital bed directly below the fixture. The examination light is directed to the entire top surface of the hospital bed. The ambient light is directed to a wall abutting the head of the hospital bed so that it is reflected back to a large area in the vicinity of the hospital bed.

The patent includes fourteen claims, two of which, claims 1 and 3, are independent. An independent claim recites all of the elements necessary to infringe the claim. A dependent claim references another claim and necessarily includes all of the elements recited in the claim itself and recited in the claim or claims from which it depends.

The discussion below does not include every term of all of the claims. The parties, through counsel, have discussed the claims and the terms which are believed to require interpretation by the Court due to disputes as to how these terms should be understood. All disputed terms are discussed in this statement. All terms which are not discussed are believed by both parties to retain their ordinary meaning and to be clear. Furthermore, ALS asserts that most of the disputed terms also are to be interpreted in accordance with their "ordinary and customary" meanings. The meaning of the terms which have no ordinary meaning are clear from the disclosure of the '254 patent.

A. Claim 1

Claim 1 of the '254 patent is directed to "a medical lighting system" and includes four elements:

1. a body;

2. means for ceiling-mounting said body;

3. a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;

4. a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body.

The terms which require interpretation are underlined above.

1 *Means for Ceiling-Mounting Said Body*

The second element of claim 1 recites means for mounting the body of the lighting system on the ceiling. This element is in means-plus-function format and is to be interpreted pursuant to 35 U.S.C. § 112, paragraph 6. The patent statute provides that claim elements may

be written as means for performing specified functions without recitation of specific structures which perform those functions. Such claim elements are to be interpreted to include the structures shown in the specification for performing the recited functions, and equivalents thereof. In interpreting such an element, the Court must first determined the recited function. Once the function is determined, the Court is to determine the structures recited in the specification for performing function. Claim interpretation requires both the determination of the function and determination of the disclosed structure or structures.

With respect to claim 1, the recited function is mounting the body on the ceiling. However, the specification of the '254 fails to disclose any structures for performing that function. Therefore, this claim element cannot be fully interpreted by the court. When the specification fails to recite any structure for performing a function recited in the claim, the claim is invalid. *Atmel Corp. v. Information Storage Devices*, 198 F.3d 1374, 1378-1379 (Fed. Cir. 1999); *In Re Donaldson*, 16 F.3d 1189, 1195 (Fed. Cir. 1994). While the issue of invalidity not currently before the Court in connection with its claim interpretation, the court will be unable to provide a complete interpretation of this element as a result of the lack of any structure in the specification.

2. *Oriented to direct light*

The third element of claim 1 recites a first fixture within the body oriented to direct light. The term "oriented to direct light" is used repeatedly throughout the claims of the '254 patent. This term can be interpreted in accordance with its ordinary meaning. "Oriented," within the context of the claims, means "to put in correct position or relation". *See* excerpts from Webster's Third International Dictionary (hereinafter "Websters"), attached as Exhibit 3. "To direct" means "to follow a straight course with a particular destination". Websters, Exhibit 3. Thus, the

first light fixture is defined by a structure positioned to aim light emitted by the fixture to a destination. As discussed by Dr. Lewin, one of ordinary skill in the art would understand that "directing light" means that the majority of the light or the highest intensity light from the fixture is purposely directed towards a target. See Statement of Ian Lewin, p. 2. Light from any fixture is dispersed in many directions. However, the recitation in the claims of the light being "directed" requires that the light be aimed in a direction. This is understood by those of ordinary skill in the art as a reference to the majority of the light or the part having the highest intensidy. If only a small portion of the light is emitted by a fixture in a recited direction, the light cannot be considered to be directed in that direction. Claim 1 further identifies how the light is aimed by identifying a direction and a target area to which the light from the fixture is directed.

If claim 1 were interpreted so as not to be limited to the highest intensity light being aimed in the direction towards the recited target, the claim would be invalid. Various prior art patents disclose lighting fixtures providing light from different sources in many directions. See Statement of Ian Lewin, pp. 6-10. Claim of the '254 patent differs from these prior art patents in that it recites directing the light in specific directions to a specific target area. Generally, claims should be interpreted to preserve validity. *ACS Hosp. Sys., Inc. v. Montefiore Hosp.*, 732 F.2d 1572, 1577 (Fed.Cir.1984) ("claims should be so construed, if possible, as to sustain their validity"). Therefore, claim 1 should be interpreted to require the highest intensity light to be aimed in the recited direction to the recited target.

3. *Downwardly*

Claim 1 recites that the first fixture directs the light downwardly. This term provides the direction for the highest intensity of the light. The ordinary meaning, decending from a source

Websters), can be used for this term. Downwardly means that the light is aimed below the first fixture. See Statement of Ian Lewin, p. 2

4. *A Selected Reading Area*

The target area recited in claim 1 is "a selected reading area under said body." This term has no ordinary or customary meaning. Thus, according to the principles of claim interpretation, the specification must be used in determining the meaning of this term. The claim itself identifies the reading area as being under the body or the light fixture. The specification identifies the reading area by reference number 400 in Fig. 1. It further indicates an objective of the invention as providing a reading light for illumination over an area appropriate for a patient reading in bed. ('254 patent, col. 1, lines 42-47; col. 2, lines 3-6). Thus, the reading area is a defined area under the lighting system body used by a patient for reading. See Statement of Ian Lewin, pp. 2-3.

5. *Second Light Fixture – Oriented to Direct Light*

The final element recited in Claim 1 is a second light fixture within the body oriented to direct light. The term "oriented to direct light" has the same meaning as discussed above with respect to the first light fixture. The second light fixture is arranged to aim the light in a given direction. As discussed above, the terms "to direct light" means that the majority of light or highest intensity light is aimed in the given direction.

6. *Downwardly and outwardly*

Claim 1 recites the direction of the light from the second light fixture as "downwardly and outwardly." This differs from the direction of light from the first fixture which was just "downwardly." Downwardly refers to a direction below the fixture. Outwardly means toward the outside or in an outward direction. Websters, Exhibit 3. Downwardly and outwardly, when

used jointly, mean a direction which is below, yet outside the area of the body. This direction is consistent with the target area, the vertical wall surface, as discussed below. See Statement of Ian Lewin, pp. 3-4.

7. *A Vertical Wall Surface Outwardly Adjacent From Said Body*

The target area for light from the second fixture is recited in the claim as "a vertical wall surface outwardly adjacent from said body." This term is interpreted in accordance with its ordinary meaning. The body is mounted horizontally on or in the ceiling. The target for the second light fixture is a vertical wall. The wall is one which is adjacent, i.e., next to or near, the body, which is mounted on the ceiling.

8. *Reflected Back To A Broad Area*

The target area for the light from the second fixture is further defined by an area to which light is reflected from the wall. Light from the second fixture is aimed at a wall so that it is reflected back off the wall. The light is reflected off the wall to a broad area under the body. As with the reading area, the broad area has not ordinary meaning. The specification identifies the "broad area" as a wide or large area around the patient's bed under the lighting system. ('254 patent, col. 1, lines 42-45; col. 2, lines 6-10).

9. *Summary*

Claim 1, when properly interpreted, requires, among other things, two light fixtures oriented to direct light in two distinct manners. Directing light, in this context, means that the highest intensity light is pointed in a direction to a defined target area. The first fixture directs light in a downward direction to an area, under the body of the lighting system, useful for a patient in a bed under the fixture to read. The second fixture directs light in a downward and

outward direction to a vertical wall so that it is reflected back to an area around a patient bed under the fixture.

Furthermore, this interpretation of claim 1 is consistent with the invention as disclosed in the specification. Fig. 1 illustrates light from the fixtures. The light from the first fixture is shown as exiting the fixture at an angle so as to remain under the body of the lighting system. Fig. 1 further illustrates a reading area 400 as being a portion of the bed. Light from the second fixture is shown as proceeding at an angle away from the fixture to the wall and by the heand of you bed.

B. Claim 3

Independent claim 3 also recites a medical lighting system. It includes five elements. The first four elements are worded identically to the elements of claim 1 These elements should be interpreted in the same manner as discussed above with respect to claim 1. The fifth element recites: "a third light fixture within said body oriented to direct light downwardly under said body to a selected patient examination area." As with the elements of claim 1, the term "oriented to direct light" should be interpreted to mean that fixture has a structure which causes the highest intensity light to be aimed in a direction towards a target. With respect to the third light fixture, the direction is "downwardly" and should be interpreted in the same manner as the direction for the first light fixture discussed above. However, the target area is different for the third light fixture. Claim 3 recites the target area as a selected patient examination area. "Patient examination area" has no ordinary or customary meaning. The specification of the '254 patent, however, clearly identifies the patient examination area as "the entire area of the patient's bed." ('254 patent, col. 1, lines 47-49; col. 2, lines 10-17.) See statement of Ian Lewin, p. 5.

Thus, similar to claim 1, claim 3 should be interpreted to require three light fixtures, each of which cause the highest intensity of light from the fixture to be aimed in the recited direction to a recited target. For the first and third fixtures, the direction is downward below the body of the lighting system. The target area for the first fixture is a portion of the bed area of a patient bed under the lighting system. The target area for the third fixture is the entire patient bed. The second light fixture directs the highest intensity light in a direction downward and outward away from the lighting system to a vertical wall. The light is directed so that it reflects off the wall to a large area around the patient bed.

C. Dependent Claims

Genlyte has asserted infringement of all of the claims of the '254 patent. Claim 2 depends from claim 1. Claims 4-14 depend, directly or indirectly, from claim 3. The dependent claims recite additional features of the various light fixtures of claims 1 and 3. While most of the terms of these dependent claims are clear and receive their ordinary meaning. The parties believe that several terms in these claims require interpretation.

1. *Reflector*

Claims 2 and 4 recite that the first and second light fixtures each include a reflector and a fluorescent bulb. A "reflector" is a known structure in a lighting fixture which causes light to be distributed or directed. Reflectors can have different shapes and surfaces. The reflectors, as recited in claims 2 and 4, are specular or semi-specular surfaces shaped and positioned to reflect light from the bulb in the direction recited in claims 1 and 3. Specular and semi-specular surfaces are a necessary part of claims 2 and 4 so that the light is directed toward the defined target. Diffuse surfaces, which can also be used as reflectors in light fixtures, provide a broad light distribution without providing a directionality of higher intensity light. See Statement of

Ian Lewin, p. 6. Thus, a diffuse surface fails to operate in accordance with the terms of the claims as is excluded from the meaning of the claims of the '254 patent.

2. *Fluorescent Assembly*

Claim 4 recites that the third fixture includes a reflector and fluorescent assembly therein. A fluorescent assembly includes one or more bulbs within a single reflector. See Statement of Ian Lewin, p. 6. The '254 patent discloses two or four bulbs within a single reflector for the examination light. See Fig. 2, col. 2, line 66 – col. 3, line 4.

3. *Light Distribution Pattern*

Claims 5 and 7, which depend from claim 4, recite that the bulbs in the fluorescent assembly have "a light distribution pattern oriented in a direction perpendicular to the ... fluorescent bulbs." A light distribution pattern is a term of art within the lighting industry which means the direction where the major intensity of the light from a bulb is directed. Claims 5 and 7 recite that the major intensity of light from a bulb must be perpendicular to the axis of the bulb.

4. *Glare*

Claims 13 and 14, which depend from claim 3, recite that the fixtures set forth in claim 3 exclude glare from certain areas. Claim 13 recites that the first and second fixtures exclude glare from being directed to a forward area of a standard hospital bed. Claim 14 recites that the first and second fixtures exclude glare from areas adjacent to a standard hospital bed. Glare, under either its ordinary meaning or as understood within the art of the invention, means a level of luminance which causes annoyance, discomfort or loss of visual performance. Claim 3 recites that the fixtures direct light of the highest intensity to specific target areas. Claims 13 and 14 require the light outside the target area to have a sufficiently low intensity so as to not bother persons at those areas.

IV. CONCLUSION

The claims of the '254 patent generally can be interpreted in accordance with the ordinary meaning of the language used in the claims. Such interpretation provides that each of the fixtures recited in the claims cause the highest intensity of light from the fixture to be directed in a defined direction to a defined target location. Furthermore, as recited in the claims, the first and second fixtures direct light in different directions to significantly different target areas.

Respectfully submitted,

Dated: May 17, 2006

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CERTIFICATE OF SERVICE

I hereby certify that this document filed through the ECF system will be sent electronically to the registered participants as identified on the Notice of Electronic Filing (NEF) and paper copies will be sent to those indicated as non-registered participants on May 18, 2006.

Brett N. Dorny

DEFENDANT'S MARKMAN STATEMENT

EXHIBIT 1

United States Patent [19]

Fabbri et al.

[11] **Patent Number: 5,038,254**

[45] **Date of Patent: Aug. 6, 1991**

[54] **INTEGRATED MEDICAL LIGHT SYSTEM**

[75] Inventors: **Wiliam C. Fabbri, Billerica; Roy Crane, Wilmington, both of Mass.**

[73] Assignee: **Keene Corporation, Union, N.J.**

[21] Appl. No.: **629,436**

[22] Filed: **Dec. 18, 1990**

[51] **Int. Cl.**[5] **F21V 13/00**

[52] **U.S. Cl.** **362/33; 362/225; 362/147; 362/804**

[58] **Field of Search** 362/33, 225, 240, 364, 362/147, 804

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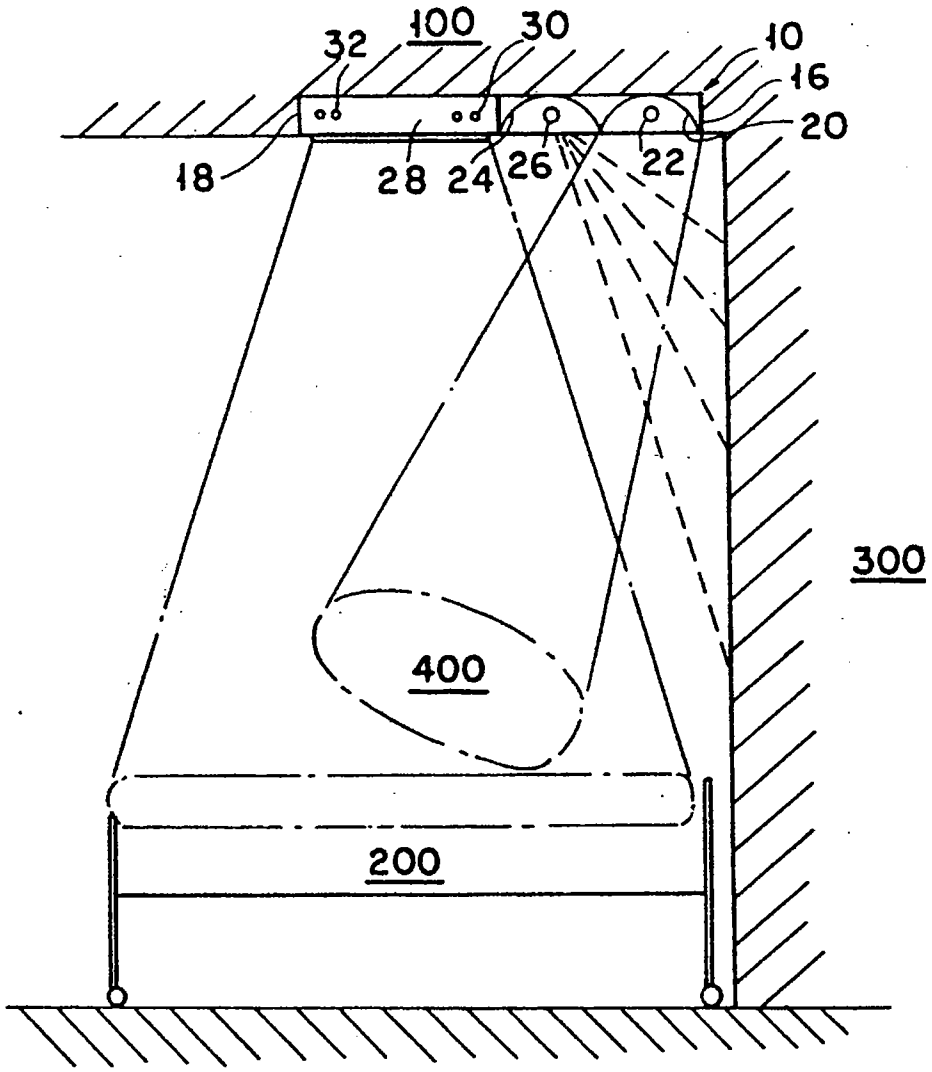
Primary Examiner—Stephen F. Husar

Attorney, Agent, or Firm—Kane, Dalsimer, Sullivan, Kurucz, Levy, Eisele and Richard

[57] **ABSTRACT**

The apparatus is a medical lighting system which includes a ceiling-mount reading light, examination light and ambient light. The reading light is directed toward a selected reading area on a hospital bed directly below the medical lighting system. The examination light illluminates the entire top surface of the hospital bed. The ambient light directs light to a wall abutting the head of the hospital bed thereby providing reflected light to the vicinity of the hospital bed.

14 Claims, 2 Drawing Sheets



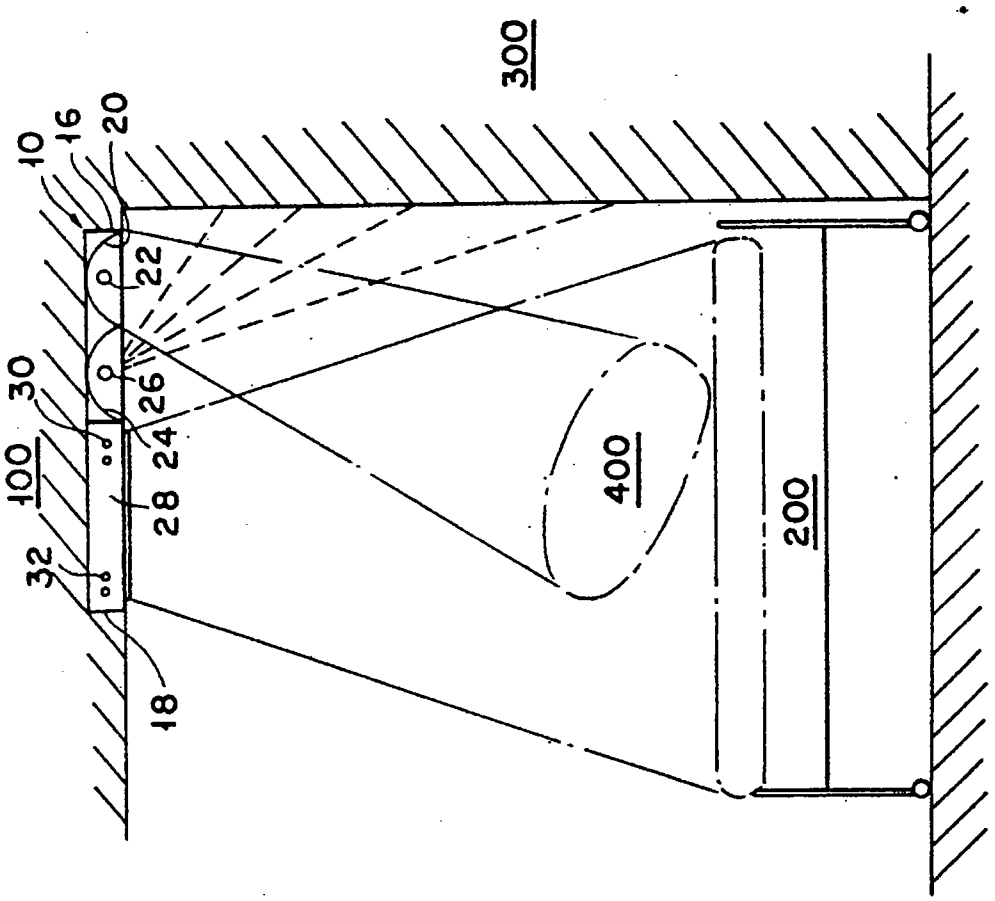


FIG. 1

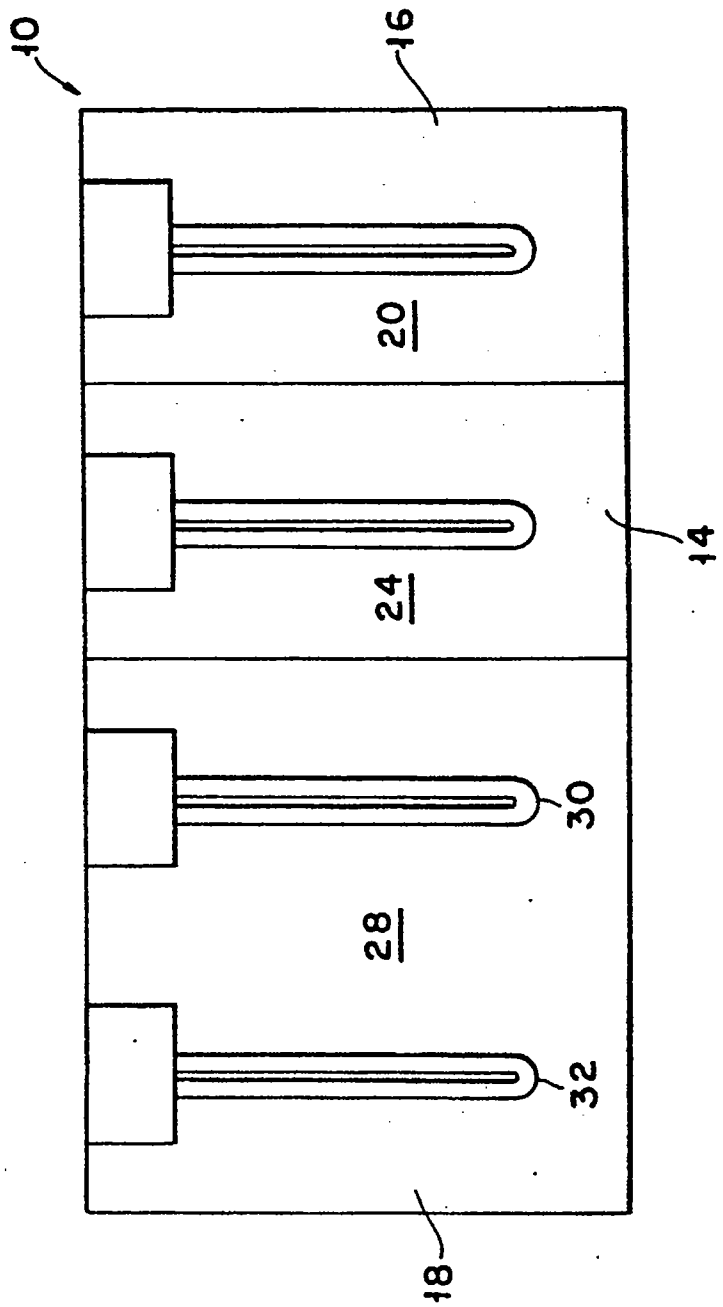


FIG. 2

INTEGRATED MEDICAL LIGHT SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention pertains to a light system for use in hospitals and health facilities. The light system includes an examination light, an ambient light, and a reading light and is preferably mounted in the ceiling.

2. Description of the Prior Art

In hospitals and similar health or medical facilities, it is desirable to provide the bedridden patient with three types of lights—the first is an ambient light which provides background, preferably reflected, light to a large area surrounding the bed; the second is a reading light which provides direct light to a portion of the patient's bed; and the third is an examination light which directs a high intensity light to substantially the entire area of the patient's bed. The ambient light typically has an illumination value of approximately 50 foot-candles while the reading light typically has an illumination value of approximately 70 foot-candles and the examination light typically has an illumination value of approximately 100 foot-candles.

In the prior art, these lights were typically provided individually in a haphazard way. Different types of lamps and light fixtures were placed around the bed with numerous plugs competing with medical equipment for available outlet space. Moreover, such an arrangement was unsightly and could impede the mobility of the patient, the patient's bed, or the surrounding medical equipment.

Wall-mounted fixtures alleviated some of the above-identified deficiencies but still left much to be desired aesthetically and, more importantly, could impede access to the patient, and were easily damaged by motor driven bed headboards.

OBJECTS AND SUMMARY OF THE INVENTION

It is therefore an object of this invention to provide an integrated medical lighting system which provides an ambient light with an illumination value of about 50 foot-candles over a wide area; a reading light with an illumination value of about 70 foot-candles over an area appropriate for a patient reading in bed; and an examination light with an illumination value of about 100 foot-candles over the entire area of the patient's bed.

It is therefore a further object of this invention to provide an integrated medical lighting system which requires no more than one or two electrical connections.

It is therefore a still further object of this invention to provide an integrated medical lighting system which does not impede access to the patient, the patient's bed, or surrounding medical equipment.

It is therefore a final object of this invention to provide an integrated medical lighting system which is aesthetically pleasing.

These and other objects are effectively attained by providing a ceiling-mounted medical lighting system which includes three individual dedicated light fixtures. The lighting system is rectangular and is designed to be placed so that one of the shorter ends of the rectangle is placed substantially on the ceiling-wall interface directly over the head of the patient's bed. The bed is placed so that the longer sides of the bed are parallel to the longer sides of the rectangular light fixture.

A first light fixture includes a fluorescent bulb and a reflector designed to direct light toward the forward portion of the patient's bed so as to allow a patient to read comfortably. A second light fixture includes a fluorescent bulb and a reflector designed to direct light toward a vertical wall abutting the head of the patient's bed so as to provide a reflected light over a large area around the patient's bed. A third light fixture includes two to four fluorescent (preferably biax ® or other U-shaped) bulbs which are oriented perpendicularly to the bed. The fluorescent bulbs have a light distribution pattern which is substantially oriented in the direction perpendicular to the bulb. Therefore, the entire area of the bed is efficiently illuminated providing an examination light.

BRIEF DESCRIPTION OF THE DRAWINGS

Further objects and advantages of the invention will become apparent from the following description and claims, and from the accompanying drawings, wherein:

FIG. 1 is a side plan view of the integrated medical light system of the present invention.

FIG. 2 is a bottom plan view of the integrated medical light system of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings in detail wherein like numerals indicate like elements throughout the several views, FIG. 1 is a side plan view of lighting fixture **10** shown installed in ceiling **100** directly over bed **200**. FIG. 2 shows the rectangular shape of lighting fixture **10** formed by long sides **12, 14** and short sides **16, 18**. Long sides **12, 14** are typically four feet in length while short sides **16, 18** are typically two feet in length. As shown in FIG. 1, short side **16** abuts the wall-ceiling (**300, 100**, respectively) interface directly over the head of bed **200**. Long sides **12, 14** are parallel to the longer side of bed **200**.

Reading light reflector **20** is along short side **16** of lighting fixture **10** proximate to wall **300** and includes a fluorescent bulb **22** positioned therewithin parallel to short sides **16, 18** of lighting fixture **10** so as to provide a direct light to reading area **400** of bed **200** as shown on FIG. 1. Reflector **20** and bulb **22** are chosen to provide an illumination of approximately 70 foot-candles to reading are **400**.

Ambient light reflector **24** is inwardly adjacent to reading light reflector **20** and includes a fluorescent bulb **26** positioned therewithin parallel to short sides **16, 18** of lighting fixture **10** so as to reflect or bounce light from wall **300** thereby providing ambient light to bed **200**. Reflector **24** and bulb **26** are chosen to provide approximately 50 foot-candles of illumination to the ambient area.

Reflectors **20, 24** and bulbs **22, 26** are configured so as not to direct glare toward the head of bed **200** where the patient's head is likely to be, whether in a supine or sitting position. Similarly, reflectors **20, 24** and bulbs **22, 26** are configured so as not to direct glare to areas adjacent to bed **200** so as to allow other beds (not shown) to be placed proximate thereto without undue disturbance of neighboring patients.

Examination light reflector **28** is outwardly adjacent to ambient light reflector **24**, includes short side **18** and is opposite from reading light reflector **20**. Examination

light reflector 28 includes two to four fluorescent bulbs 30, 32. Fluorescent bulbs 30, 32 (preferably biax ® or other U-shaped) are parallel to short sides 16, 18 of lighting fixture 10. As fluorescent bulbs 30, 32 have a characteristic directional light distribution pattern oriented in the direction perpendicular to the bulbs, the entire area of the bed 200 is efficiently illuminated. The bulbs 30, 32 and reflector 28 are chosen to provide 100 foot-candles of illumination to the bed 200. An important feature of the present invention resides in the orientation of the lamps within the lighting 1 fixture which permits the lighting fixture 10 to be packaged in a two foot by four foot configuration and thereby replace a conventional troffer.

Bulbs 22, 26, 30 and 32 are powered by a single electrical source, preferably supplied from wiring within ceiling 100 although the use of a single electric cord (not shown) engaging an electrical socket (not shown) may be used. A single switch module (not shown), either hand-held or built into wall 300, is used to control bulbs 22 and 26 and a wall switch to control bulbs 30 and 32.

To use this device, the patient operates the switch module (not shown) to operate selectively bulbs 22 and 26. Medical personnel control bulbs 30 and 32 of the examination lighting from a switch on the headwall, not easily accessible to the patient.

Thus the several aforementioned objects and advantages are most effectively attained. Although a single preferred embodiment of the invention has been disclosed and described in detail herein, it should be understood that this invention is in no sense limited thereby and its scope is to be determined by that of the appended claims.

What is claimed is:

1. A medical lighting system comprising:

a body;

means for ceiling-mounting said body;

a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;

a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body.

2. The medical lighting system of claim 1 wherein said first light fixture includes a first reflector and a first fluorescent bulb therewithin; and said second light fixture includes a second reflector and a second fluorescent bulb therewithin.

3. A medical lighting system comprising:

a body;

means for ceiling-mounting said body;

a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body;

a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body;

a third light fixture within said body oriented to direct light downwardly under said body to a selected patient examination area.

4. The medical lighting system of claim 3 wherein said first light fixture includes a first reflector and a first fluorescent bulb therewithin; said second light fixture includes a second reflector and a second fluorescent bulb therewithin; and said third light fixture includes a third reflector and a fluorescent assembly therewithin.

5. The medical lighting system of claim 4 wherein said fluorescent assembly includes at least one fluorescent bulb with a light distribution pattern oriented in a direction perpendicular to said at least one fluorescent bulb.

6. The medical lighting system of claim 5 wherein said at least one fluorescent bulb is a "biax"-type bulb.

7. The medical lighting system of claim 5 wherein said fluorescent assembly includes at least two fluorescent bulbs with a light distribution pattern oriented in a direction perpendicular to said at least two fluorescent bulbs.

8. The medical lighting system of claim 7 wherein said at least two fluorescent bulbs are "biax"-type bulbs.

9. The medical lighting system of claim 5 wherein said body is rectangular and a first shorter and of said body is designed to abut the vertical wall surface; wherein said first fluorescent light fixture abuts said first snorter end and said first fluorescent light bulb is parallel to said first shorter end; wherein said second fluorescent light fixture is inwardly adjacent to said first fluorescent light fixture and said second fluorescent light fixture is parallel to first shorter end; and wherein said third fluorescent light fixture is outwardly adjacent from said second fluorescent light fixture and abuts a second shorter end of said body; and wherein said at least one fluorescent bulb is parallel to said first shorter end.

10. The medical lighting system of claim 9 wherein said first and second shorter ends are substantially two feet in length and said body includes first and second longer ends which are substantially four feet in length.

11. The medical lighting system of claim 9 wherein said first light fixture illuminates said selected reading area to substantially 70 foot-candles; wherein said second light fixture illuminates said broad area to substantially 50 foot-candles; and wherein said third light fixture illuminates said patient examination area to substantially 100 foot-candles.

12. The medical lighting system of claim 11 wherein said patient examination area is sufficient in size to include a standard hospital bed when said first light fixture is substantially directly over a head of the standard hospital bed, the head of the standard hospital bed substantially abutting the vertical wall surface.

13. The medical lighting system of claim 3 wherein a distribution of light from said first and second light fixtures excludes glare from being directed to a forward area of a standard hospital bed placed below the medical lighting system.

14. The medical lighting system of claim 3 wherein a distribution of light from said first and second light fixtures excludes glare from areas adjacent to a standard hospital bed placed below the medical lighting system.

* * * * *

DEFENDANT'S MARKMAN STATEMENT

EXHIBIT 2

UNITED STATES DISTRICT COURT
DISTRICT OF MASSACHUSETTS

GENLYTE THOMAS GROUP LLC, **Plaintiff/Counterclaim Defendant,** **v.** **ARCHITECTURAL LIGHTING SYSTEMS, a division of ARCH LIGHTING GROUP,** **Defendant/Counterclaimant.**	**Civil Action No. 05-CV-10945 REK**

STATEMENT OF IAN LEWIN

May 16, 2006

- **Background and Introduction**

I have been requested by the Law Offices of Brett N. Dorny on behalf of Architectural Lighting Systems ("ALS") to evaluate certain aspects of Patent No. 5,038,254 ('254 patent), inventors Fabbri and Crane, which I understand to be assigned to Genlyte Thomas Group, LLC ("Genlyte").

As background I hold a Ph.D. in Illuminating Engineering, and I have 38 years of professional experience in matters related to the design and use of lighting equipment. I have served as Research Manager for a major lighting manufacturer, and have operated independent lighting product development facilities for a period of 33 years. This has included development of lighting devices for hospital use. I hold 22 US patents for lighting products. I am past-president of the Illuminating Engineering Society of North America, IESNA and have served on numerous national and international standards committees concerning light and lighting equipment. My full Curriculum Vitae is attached as Exhibit A. My CV provides the titles and publication journals of 141 technical papers authored by me on the subject of lighting, many of which have been presented to meetings of scientific organizations and peer reviewed.

Claim Construction

I have reviewed the claims of the '254 patent, and in particular certain specific terms, to ensure that their meaning is clear. I have concentrated on the independent claims, namely claims 1 and 3. During this effort I have analyzed the claim terminology as I believe it would be understood by a person of ordinary skill in the art.

- **Claims 1 and 3. "... oriented to direct light downwardly to a selected reading area."**

Term: "oriented"

Meaning: set and angled

Rationale: In order to achieve emission of the light rays in the required direction, the lighting fixture must be set in a position to allow this to happen and must be angled appropriately for the purpose.

Term: "to direct light"

Meaning: to aim the highest intensity of light

Rationale: The term "direct" has a specific meaning, and refers to the *purposeful directing of the highest intensity of light towards a target.* For example, if a hiker directs his flashlight to a mile marker, he aims the flashlight to the target, which in this case is the mile marker, causing the flashlight's highest intensity to fall on the target. Thus the hiker achieves his purpose, which is to provide enough light for reading of the mile marker. If the hiker aims his light elsewhere, say 10 feet to the left of the mile marker, some light will still fall on the mile marker, but it cannot now be said that he is still directing his light to the mile marker. Thus the ordinary meaning of the verb "direct" in reference to lighting is that the highest or maximum intensity is aimed at a desired target to achieve a specific purpose.

Term: "downwardly"

Meaning: in a direction below a horizontal plane through the fixture

Rationale: The downward component of a lighting fixture is defined in the glossary of the handbook of the IESNA, 8th edition, as "The portion of luminous flux from a luminaire emitted below the horizontal." Exhibit B.

Term: "to a selected reading area"

Meaning: to a reading area on or above the bed.

Rationale: For the claim limitation to have meaning, there must be a target area to which the maximum intensity is aimed. Without a target, the terminology "to direct light" is unclear. This target area, both by claim language and as it will be understood from the specification, is the reading area.

The terminology "oriented to direct light downwardly to a selected reading area" therefore means "set and angled to aim the highest intensity of the light in a direction below a horizontal plane through the fixture to a reading area on or above the bed."

Claims 1 and 3. "... oriented to direct light downwardly and outwardly to a vertical wall surface..."

Term: "oriented to direct light" See above definitions.

Term: "downwardly and outwardly to a vertical wall surface"

Meaning: a single direction below and outwards from the fixture so as to illuminate a vertical wall surface.

Rationale: The vertical wall is the target area for the second light, and therefore it is to this wall that the highest intensity of light is to be directed. This is made clear in the specification: " ... so as to reflect or bounce light from wall 300 thereby providing ambient light to bed 200." Column 2, lines 53-55. The specification further states that the fixture components "are configured so as not to direct glare toward the head of the bed 200 where the patient's head is likely to be ..." Column 2, lines 58-60.

It is apparent to a person skilled in the art, therefore, that a fundamental concept of the invention is the inclusion of a light fixture that preferentially directs light to an end wall, and that the reason for doing so is to reduce brightness of the fixture as seen by the patient, thus eliminating glare.

Such a principle is not simply part of a preferred embodiment, but is rather a basic principle of the covered device. This is clarified under the section "Objects and Summary of the Invention," wherein it is stated "A second light fixture includes a fluorescent bulb and a reflector designed to direct light toward a vertical wall abutting the head of the patient's bed so as to provide a reflected light over a large area around the patient's bed." Column 2, lines 6-10.

A person of ordinary skill in the art will understand that for a light fixture to be effective in providing room ambient lighting through reflection from a wall, the intensity of light directed to the wall must be relatively high. Similarly, such a skilled person will know that prevention of glare to a patient requires a relatively

low intensity of light being directed toward the patient's eyes, other factors being equal.

The basic concept of the second light fixture of the claimed invention, described earlier, necessitates higher intensity in directions toward an end wall than towards the bed, otherwise the second fixture will not be effective and efficient in fulfilling its function. As will be known by a person of ordinary skill in the art, effectiveness and efficiency are essential for an invention as described in the '254 patent to be useful.

The terminology "...oriented to direct light downwardly and outwardly to a vertical wall surface therefore means "set or arranged to aim the highest intensity of the light in a direction below a horizontal plane through the fixture and outwards from the fixture so as to illuminate a vertical wall..."

- **Claims 1 and 3: "... to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body."**

Term: "outwardly adjacent from said body"

Meaning: that is close to a shorter end of the fixture and adjacent to the head of the patient's bed.

Rationale: To properly comprehend the meaning of this phase, a person of ordinary skill in the art will consult the specification, which states "The light system is rectangular and is designed to be placed so that one of the shorter ends of the rectangle is placed substantially on the ceiling-wall interface directly over the head of the patient's bed." Column 1, lines 65-68.

Term: "reflected back to a broad area"

Meaning: Reflected from the wall to provide illumination over a wide area beneath the body that houses the fixture."

Rationale: The purpose of directing light toward the end wall is so that reflected light from the wall provides the room ambient illumination, rather than such illumination being created directly by the fixture, where it might create glare to the patient.

Thus the terminology "to a vertical wall surface outwardly adjacent from said body whereby light is reflected back to a broad area under said body" means "to a vertical wall surface that is close to the shorter end of the fixture and adjacent to the head of the patient's bed, whereby light is reflected from the wall to provide illumination over a wide area beneath the body that houses the fixture."

- **Claim 3 "... oriented to direct light downwardly under said body to a selected patient examination area."**

Term: oriented to direct light downwardly

Meaning: See above

Term: "... to a selected patient examination area"

Meaning: to an area on or above the bed

Rationale: Just as the first and second lights have target areas to where the highest light intensity is directed, so must the third light, in order to give meaning to the limitation. In this case the target area is the patient on the bed.

The terminology "... oriented to direct light downwardly under said body to a selected patient examination areas" means "... set and angled to aim the highest intensity of the light in a direction below a horizontal plane through the fixture to the area on or above the bed."

- **Additional Consideration Regarding the Second Light of Claims 1 and 3.**

The meaning of the terminology "... to direct light downwardly and outwardly to a vertical wall surface ..." has been discussed and clarified above. It should be recognized that any alternative understanding of this limitation, whereby "to direct light" is said to encompass the mere spilling of light onto and end wall, without the purposeful aiming of the highest intensity towards the wall, is incorrect. Firstly, use of the verb "direct" in the lighting industry has been illustrated earlier by the analogy of the hiker and flashlight. Secondly, it is my opinion that the language of claim 1 and 3 of the '254 patent that relates to the second light would be meaningless unless it is interpreted as requiring higher intensity of light being directed to an end wall versus elsewhere. Unless interpreted in this sense, the claim language concerning the second light would be descriptive of virtually any ceiling mounted lighting fixture. Hundreds of commercial lighting products are available for general lighting, or "ambient" lighting in the words of the patent, that provide light in both downward and outward directions towards a wall, but that have higher intensities straight down rather than to a wall. Thus the claim language is meaningless unless it is applied with the understanding that more light, in terms of higher intensity, is directed towards an end wall than elsewhere. As has been made clear in the specification, the inventors intended that "the second light includes a fluorescent bulb and a reflector designed to direct light to a vertical wall abutting the head of the patient's bed so as to provide a reflected light over a large area around the patient's bed." Column 2, lines 6-10.

- **Claims 2 and 4 "...reflector..."**

Term: "reflector"

Meaning: a semi-specular or specular surface shaped and positioned to reflect light from a fluorescent bulb in a desired direction.

Rationale: When it is required to aim reflected light in a specific target direction, and such aiming cannot be created simply by a chosen orientation of the tubes, a semi-specular or specular reflecting surface is required to provide the desired directionality.

- **Claims 5 and 7. "...fluorescent assembly..."**

Term: "fluorescent assembly"

Meaning: One or more fluorescent bulbs within a single reflector.

Rationale: Each fluorescent assembly consists of one or more fluorescent bulbs that are grouped within a particular fixture and are optically controlled by a reflector.

- **Claims 5 and 7. "...with a light distribution pattern oriented in a direction..."**

Term: "a light distribution pattern"

Meaning: The direction(s) where the major intensity of light is projected.

Rationale: The claim is describing the main projection of light from a fluorescent bulb, which is perpendicular to the axis of the bulb, and which can be identified by the major intensity from the tube.

- **Claims 13 and 14. "...excludes glare from being directed..."**

Term: "glare"

Meaning: A sense of annoyance, discomfort or loss in visual performance or visibility created by excessive luminance.

Rationale: Definition of glare, Handbook of IESNA, 8th Edition, Glossary of terms. Exhibit H.

Prior Art Issues Related to Invalidity

I have been requested to locate and review materials that may be considered to be prior art to the '254 patent. I have secured and reviewed the following:

U.S. Patent no. 2,557,129 ('129 patent) Inventor: McDaid. "Spotlighting Unit" Date of issue: June 1, 1948. Exhibit C.

U.S. Patent no. 4,816,969 ('969 patent) Inventor: Miller. "Wall-mounted over Bed Lighting Fixture" Date of issue: March 28, 1989. Exhibit D.

I have further examined the 8th edition of the Handbook of the Illuminating Engineering Society of North America, specifically the section devoted to luminaires, (i.e. lighting fixtures).

- The '129 Patent. Exhibit C.

The '129 patent discloses a spotlight that attaches to a ceiling lighting fixture.

The spotlight, and the ceiling fluorescent light to which it is attached, form a composite light device with multiple uses. The spotlight can be employed to direct light to a specific area, and as such it can function as a reading light. The ceiling fluorescent light is simply described as "a ceiling type fixture," which a person of ordinary skill in the art will understand can be used for the purpose of providing general or ambient room lighting by conventional means.

The two lights are electrically interconnected "in operative association therewith." (Column 1, lines 11-12).

It is apparent from the teaching of this patent that a ceiling mounted lighting fixture can serve multiple separate functions. It may usefully be employed over a hospital bed. In such an application, the spotlight can function as a reading light, with the fluorescent light providing ambient light. Certain ceiling fluorescent lights such as those described in the '129 patent may direct their maximum intensity at or around nadir. Such a fixture is illustrated in the Handbook of the Illuminating Engineering Society of North America, 8th edition, figure 9-34, "typical luminaire" no. 36. Exhibit E. It may be noted that if placed above a bed, and particularly if oriented parallel to an end wall, some light will fall on the end wall.

Other ceiling fluorescent lights are designed to cast their maximum intensity at higher angles from nadir, considering directions perpendicular to the lamp axis. Such a typical fixture also is illustrated in the Illuminating Engineering Society of North America Handbook, figure 9-34, "typical luminaire" no. 35. Exhibit E. From the polar intensity diagram immediately right of the fixture diagram, the maximum intensity in a plane perpendicular to the lamps is at roughly 35° from nadir. Such a light positioned reasonably close and parallel to an end wall will direct its maximum intensity onto the end wall. It will thereby create ambient lighting by reflection from the wall.

The '129 patent specifies that the spotlight is contained in an "outer shell" which attaches to the end of a fluorescent fixture. This is illustrated in figure 1 of the

patent as having a contour that in essence extends the fluorescent fixture by adding a matching compartment to house the spotlight. It will be obvious to a person of ordinary skill in the art that while the spotlight can be added as an extension of the fluorescent fixture in this way, the fluorescent fixture could alternatively simply be manufactured with this extension as part of its body, similarly providing the required space for the spotlight.

Specifically, the claim 1 of the '254 patent recites:

- "A medical lighting system ..."

The '129 patent discloses a system of two lighting fixtures that can be usefully employed as a medical light.

- "A body ..."

The '129 patent discloses the use of a body, which can house the spotlight only with a separate body for the fluorescent fixture, or through obviousness, a single body that houses the spotlight and the fluorescent fixture.

- "Means for ceiling-mounting said body."

The '129 patent discloses that it uses a "ceiling-type fixture"

- "a first light fixture within said body oriented to direct light downwardly to a selected reading area under said body ..."

The '129 patent provides a spotlight that can be directed to a selected reading area.

- "a second light fixture within said body oriented to direct light downwardly and outwardly to a vertical wall surface outwardly adjacent said body whereby light is reflected back to a broad area under said body."

If the limitation of claims 1 and 3 of the '254 patent concerning the second, or ambient, of this limitation is improperly construed to include any fixture that allows light to fall on an end wall, clearly the '129 patent allows such use.

Moreover, the '129 patent is not limited in terms of the type of fluorescent fixture or light distribution that it may produce. This is specifically stated: "However, it is to be noted that this invention is adaptable for use in association with any type of suspension or ceiling type fixture, the same being shown in the drawings by way of example only." Column 2, lines 10-13. It will be apparent to a person of ordinary skill in the art that the combination light can include a typical luminaire of the type 35 shown in the Illuminating Engineering Society of North America Handbook. Exhibit E. It will further be known by such a person that placing such

a luminaire near a wall will be an effective means of lighting that wall, as the maximum intensity will be aimed towards the wall.

It is apparent, therefore, that if the claim limitation regarding the second light is given its proper interpretation, whereby maximum light intensity is directed to an end wall, such an arrangement will be achieved by using a fixture constructed in accordance with the '129 patent, placed parallel and next to the wall, when the fluorescent portion of the fixture is of the conventional type 35 shown in the Illuminating Engineering Society of North America Handbook, or many others like it. The '129 patent therefore represents prior art to the '254 patent.

If the claim limitation regarding the second light is given a broader but improper limitation such that the light need not be directed towards an end wall but light merely falls upon the wall due to its proximity, then it is preceded by the '129 patent using virtually any available type of ambient light, such as the conventional type 36 shown in the referenced handbook.

- The '969 Patent. Exhibit D.

This patent discloses a wall-mounted version of an over-bed lighting fixture, for use over a patient's bed "and is used in hospitals, nursing homes and the like." Column 1, lines 42-43. It consists of a "single housing", column 1, line 40, within which are two forms of fluorescent lighting fixture. A third form of light optionally can be incorporated into the single housing.

One fluorescent fixture provides downward light through a conventional bottom mounted lens. The second fixture is adjustable and can be pivoted to illuminate different areas depending on its rotational orientation. The device can be rotated such that light is directed towards a patient's reading area, and "Thus, it may be directed to provide a patient reading lamp." Column 1, lines 52-53.

Although the '969 invention is described as wall-mounted, it will be apparent to a person of ordinary skill in the art that it can also be ceiling-mounted. All that is needed is a pair of L-shaped brackets to mount it to the ceiling while retaining its described orientation. The angular setting of the rotatable portion can readily be set while ceiling mounting the fixture so that the light is directed toward a reading area.

All claim elements of claim 1 of the '254 patent are either present or obvious in the '969 patent. It describes a medical lighting system that has a body. A means for ceiling mounting is obvious through the use of simple brackets. The first light fixture or reading light is provided by the rotatable light set to aim to the reading area, and it is included in the body. The second light fixture or ambient light for general illumination is provided and is also in the body.

The ambient light fixture is equipped with "a flat, horizontal, prismatic lens which directs illumination from one or more fluorescent tubes downward to illuminate the head of the bed." The Handbook of the Illuminating Engineering Society of North America, 8th edition, can be consulted to determine the light output from a fluorescent fixture that is equipped with a flat horizontal prismatic lens. Figure 9-34 of the handbook typical luminaire no. 45 shows a fluorescent fixture with a flat prismatic lens, as referred to in the '969 patent. Exhibit F. Observing the intensity polar diagram to the immediate right of the fixture sketch, it is apparent that this fixture has its maximum intensity (towards a parallel wall) that is roughly 40 degrees from nadir. Thus the highest intensity as such is aimed at an end wall.

If the teaching of the '969 patent is used with a different flat lens or diffuser, such as typical luminaire 41 in the Illuminating Engineering Society of North America handbook, maximum intensity is directed towards the bed beneath the fixture. Exhibit G.

My comments regarding invalidity regarding the second light are similar for the '969 patent as for the '129 patent above. The '254 patent, properly applied with regard to the second light is preceded by the '969 teaching using typical luminaire 45 of the Illuminating Engineering Society of North America handbook.

If the '254 claims 1 and 3 limitation regarding the second light is improperly interpreted as encompassing conventional fluorescent light distributions having maximum intensity at or near nadir, the '254 patent is clearly preceded by prior art, as evidenced by the '969 patent.

Ian Lewin

Ian Lewin Ph.D., FIES, L.C.
May 16, 2006

STATEMENT OF IAN LEWIN

EXHIBIT A

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Ian Lewin - Curriculum Vitae

Qualifications:

- B.S. Cum Laude, University of Newcastle, England 1964. Research thesis title: "A Study of the Glare Characteristics of Locomotive Headlights"
- Ph.D., Illuminating Engineering, University of Newcastle, England 1967. Thesis title: "A Study of the Factors Affecting Visual Performance under Industrial Lighting Conditions, with Particular Reference to Disability Glare and its Measurement"
- Lighting Certified, (LC), Qualified Professional

Positions held:

- 1998-present, President and CEO, Lighting Sciences, Inc., Scottsdale, Arizona
- 1979-98 President and Founder, Lighting Sciences Inc., Scottsdale, Arizona, USA, and Lighting Sciences Canada Ltd., Waterloo, Ontario, Canada
- 1984-92 Co-founder and Director. Lighting Sciences Australasia, Pty Ltd, Melbourne, Australia.
- 1973-79 Principal, Director and Co-founder, Environmental Research Laboratories, Scottsdale, Arizona
- 1967-73 Research Director, Holophane Co.

Memberships:

1. President, Illuminating Engineering Society of North America (IESNA). 1999-2000.
2. Member, Optical Society of America.
3. Member, American Institute of Physics.
4. Member, International Society for Optical Engineering, (SPIE).
5. Member of the U.S. National Committee of the International Commission on Illumination (CIE).
6. Member, Society of Automotive Engineers, (SAE), Lighting Standards Committee.
7. Chairman, Roadway Lighting Committee, Illuminating Engineering Society of North America (1994-96).
8. Chairman of the IESNA Board of Fellows, 1989-90.
9. Director, 1985-86, Illuminating Engineering Society.
10. Alternate Director for the United States, CIE Division 2, Measurement of Light and Radiation.

11. Member and past-chairman, Testing Procedures Committee of the IESNA.
12. Member of Standard Practice Subcommittee, Research Subcommittee, and Measurements and Calculations Subcommittee, Roadway Lighting Committee, IESNA.
13. Member and past-Chairman of the Lamp Spectral Effects Committee of IESNA.
14. Chairman of the Sign Lighting Subcommittee of the Roadway Lighting Committee of IESNA.
15. US representative to CIE Committee on "Photometry of Luminaires" Standard.
16. US representative to CIE Committee on "Lighting and Crime."

Honors/Awards

- Recipient of the 1997 Medal of the Illuminating Engineering Society of North America. (The society's highest honor for technical contributions).
- Louis B. Marks award of the Illuminating Engineering Society of North America. (The society's highest honor for non-technical contributions).
- Fellow of the IESNA.
- Recipient of the Distinguished Service Award of the IESNA.
- Man of the Year, 2001. Aerospace Lighting Institute.
- Honorary Life Member, Institution of Lighting Engineers, UK
- Invited keynote speaker, 25th quadrennial session of the CIE, "Light, Dark Skies and Space." San Diego, 2003.

Teaching Positions

- 1964-67 - Gateshead (UK) College of Technology. Instructor in Lighting Technology, intermediate and advanced courses.
- 1979-82 - Arizona State University. Faculty member, School of Architecture, Illuminating Engineering courses.
- 1967-present - Instructor in numerous courses sponsored by the Illuminating Engineering Society, the Electric League, and Edison Electric Institute.

Past-projects (as Project Director); 50 Examples

Research and Product Development.

1. Exterior lighting systems for NASA International Space Station: Development of multiple designs for outer space operation.
2. Development of FAA Advisory Circular for use of Light Emitting Diode (LED) devices on airport taxiways.
3. Research on the relationship between lamp color, safety and security
4. Modular Wallpack luminaire, refractor and mechanics. (Holophane Module 600)
5. High Intensity Discharge luminaire for highway signs. (Holophane Expresslight)
6. Light trespass research, (for Edison Electric Research Institute)
7. Space Shuttle Orbiter - optical systems for fluorescent and incandescent floodlights
8. Space Shuttle Orbiter – cockpit annunciator display control lenses
9. Development of a scene luminance photometer using digital photography
10. Dental lighting optical system for examination light
11. Roadway luminaire reflectors for cut-off luminaires. (Patented)

12. Parabolic louvers for interior lighting. (Patented)
13. Downlight lens and louvers for interior lighting. (Patented)
14. 3-E lens for high efficiency, widespread distribution interior lighting. (Patented)
15. Triumph I lens for discharge lamps, with high efficiency, widespread distribution. (Patented)
16. Wall mounted refractor/reflector optical system. (Patented)
17. Anti-reflection interference coatings for metal substrates. (Patented)
18. High reflection interference coatings for glass substrates. (Patented)
19. High efficiency aperture - type display signs.
20. High mast system reflector optics for highway interchange lighting
21. Indirect ambient lighting optical systems for offices. (3 Patents)
22. Underwater floodlighting systems for unmanned submarine surveillance, U.S. Navy.
23. Floodlight optics for sports lighting. (Hubbell Lighting)
24. Development of computerized mirror goniophotometer systems
25. Development of automated Spectroradiometer system for ultraviolet, visible and infrared measurements for Bureau of Radiological Health, US Food and Drug Administration
26. Variable reflector system for high intensity flashlights. ("Mag-lite")
27. Computerized design system for automotive headlights. (Sylvania)
28. Design of compression molding facility for lens prototypes
29. Hydroponic plant growth under artificial illumination. (General Mills)
30. Development of square distribution area lighting optics
31. Floodlight reflector design for 3 KW metal halide lamps for Open Pit Mining
32. Projection screen optics for large screen television
33. Sun tracking reflectors for reusable solar energy system
34. Aircraft lighting systems for Boeing 757 and 777 aircraft
35. Compliance testing program for automotive lighting devices. U.S. Dept. of Transportation, National Highway Safety Administration, 1985 - 1992
36. Optical system for surgical illumination. (American Sterilizer)
37. Research of traffic signal optical and electrical efficiency, Federal Highway Administration.
38. System of 480 moving mirrors under computer control for daylighting capture, Bank of Hong Kong and Shanghai
39. Development of traffic signals using Light Emitting Diodes (LED's)
40. Daylighting and building energy monitoring system for improved energy usage
41. Development of outdoor lighting optical controls for use in the vicinity of astronomical observatories
42. Design of tunnel lighting luminaire with asymmetric distribution
43. Research and development of a new navigational lighting system for ships, U.S. Navy
44. Development of airport lighting optics for runway delineation
45. Development of anti-collision warning system for aircraft
46. Development of computerized electrical test apparatus for luminaires and ballasts

47. Visibility research on battlefield decoys, U.S. Army, Fort Belvoir
48. Development of a self-leveling photometer for street lighting measurements
49. Design of landing and taxing lights for the F16 aircraft, U.S. Air Force
50. Research and development of a portable photometer to measure traffic signal performance, Federal Highway Administration. (Patented)

Technical Papers
Acronym list provided at end

1. *An Economic Study of Three Light Sources.* Paper to the IESNA Roadway Lighting Committee. Spring 2004. To be published.
2. *A Long and Winding Road. (The History of Street Lighting).* LD&A, December 2004.
3. *Roadway Lighting: An Investigation and Evaluation of Three Different Light Sources.* Final report to the Arizona Department of Transportation. May 2003.
4. *Lighting in Outer Space.* Proceedings of the 25th quadrennial session of the CIE. San Diego, June 2003.
5. *Lights that Circle the Earth.* LD&A Magazine, July 2003.
6. *Skylights as Luminaires: PIER Skylight Photometric Test Results.* Paper to the IESNA Annual Conference, August 2002.
7. *Lamp Color Influences Energy Usage and Night Safety.* Proceedings of the Intertech Conference on Energy Efficient Lighting, Tucson, Arizona 2002. Leukos JIES, January 2005.
8. *Photometric Test System for Skylights and Luminaires.* Leukos, JIES. January 2005.
9. *Towards an Understanding of Lamp Spectral Effects at Night.* Proceedings of the 2002 Conference of the IES of Australia and New Zealand, Sydney.
10. *White versus Sodium Light: The Newest Developments.* Proceeding of the ILE Annual Conference, Cardiff, Wales, 2002.
11. *Lamp Color Affects Visibility.* Luce magazine, Italy, 2001.
12. *Minimizing Light Trespass – Comparing Fixtures.* Electrical Contractor, July 2001.
13. *Light Trespass – What Does It Mean for Electrical Contractors?* Electrical Contractor, July 2000.
14. *Light Trespass – Research, Results and Recommendations.* Publication TM11 of the IESNA, New York, 2000.
15. *Light Trespass and Light Pollution – Practical Approaches to Dealing with the Problems.* Proceeding of the IESNA Street and Area Lighting Conference, 2000.
16. *Aspects of Recent American Research in Lighting Technology.* Proceedings of the Joint Conference of ILE and CIBSE, York, England, 2000.
17. *Lamp Color, Visibility, Safety and Security.* Seminar proceedings, Lightfair, May 2001
18. *IESNA Approved Method for the Photometric Testing of Fiber Optics Lighting Systems.* IESNA Publication no. LM-73-02.
19. *Lumen Effectiveness Multipliers for Outdoor Lighting Design.* Journal of the IESNA, Summer 2001

20. *Light Trespass Research.* Final Report to the Lighting Research Institute, 2000
21. *Metal Halide Lamps - A Technology Review.* Aerospace Lighting Institute Seminar, January 2000, Conference Proceedings
22. *Photometrics of Fiber Optic Systems.* Proceedings of Lightfair 2000, New York
23. *Should Vision Influence Roadway Lighting Design?* Better Roads Magazine, US Federal Highway Administration, October 1999
24. *Visibility Factors in Outdoor Lighting Design.* Institution of Lighting Engineers Conference Proceedings - Portsmouth, UK, 1999
25. *Accuracy of CCD (Digital Camera) Photometric Testing.* Council on Optical Radiation Measurement, 1999
26. *Development & Analysis of a Pedestrian Crossing Warning System.* Journal of the IESNA, Summer 2000
27. *Improved Luminaire Performance by Use of Reduced Envelope Metal Halide Lamps.* IESNA Conference, 1999
28. *Optical Component Relationships in the Design of Efficient Fiber Optic Illuminators.* Journal of the IESNA, Winter 2000.
29. *Road Scholar (The influence of lamp type on driver visibility at night).* LD&A Magazine, March 1999
30. *Photometric & Optical Methods of Lamp Analysis.* Society of Automotive Engineers (SAE) 1998. SAE transaction
31. *Lamp Spectral Effects at Roadway Lighting Levels.* The Lighting Journal (UK-ILE), 1999
32. *Luminaire Photometry Using Video Camera Techniques.* JIES, Winter 1999
33. *Advanced Techniques in Lamp Characterization.* International Society for Optical Engineering, (SPIE), Conference Proceedings, 1997
34. *Backlighting for Direct View & Projection Displays.* Information Display Magazine, Vol. 13. No. 11, November 1997
35. *Lighting On Three Continents.* CIE/SANCI international conference proceedings, South Africa, 1997
36. *Accuracy Analysis of Video-based Light Measurement.* SAE 1997 Congress Proceedings
37. *On the Road Again (Visibility-based lighting design for improved road safety).* LD+A May 1996
38. *Advances in Measurement Technology for Vehicle Lighting Systems.* SAE Congress Proceedings, 1996
39. *The Design of Illumination Optics: Hardware and Software Aids.* Optical Society of America, 1995 annual conference proceedings
40. *The Design-Link for Aerospace Lighting.* Proceedings of the Aerospace Lighting Institute Conference, February 1995
41. *High Accuracy Photometry Using CCD Technology.* International Society for Optical Engineering, (SPIE), Conference Proceedings, 1995
42. *Optical Design Applications for Enhanced Illumination Performance.* International Society for Optical Engineering, (SPIE), Conference Proceedings, 1995
43. *The Application of Light Emitting Diodes to Traffic Signals.* JIES, Winter 1996

44. *Monte Carlo Techniques for the Design of Illumination Optics.* Paper to the IESNA annual conference, 1995
45. *Requirements for Application of Light Emitting Diodes (LED's) to Traffic Control Signals.* NCHRP Digest, (US Government), January 1995
46. *The Design-Link: Advances in Automotive Lighting Design, Measurement and Quality Assurance.* Conference of the Lighting Committees, SAE. Santa Fe, November 1994
47. *The Development of a High Performance LCD Backlighting System.* Conference transactions of the Society for Information Display, SID 1994, May 1994
48. *Design Technologies for Flat Panel Display Backlighting.* Aerospace Lighting Institute, February 1994, Conference Proceedings
49. *Liquid Crystal Displays - Meeting the Lighting Challenge.* LD&A, July 1994
50. *Understanding and Using Photometric Test Reports for Interior Lighting. Part 1. The Basics.* Published by Lighting Sciences Inc. 1993
51. *Principles of Liquid Crystal Display Backlighting.* SID seminar publication 1993
52. *Measurement of Small Target Visibility and Visibility Level and the Reasons for Possible Deviations.* Proceedings of the Lighting Research Institute Symposium on STV. October 1993
53. *Backlighting Technology for Color Liquid Crystal Displays.* Aerospace Lighting Institute, February 1993, Conference Proceedings
54. *Where No Luminaire Has Gone Before.* (Exterior Lighting of the NASA International Space Station), LD&A, December 1993
55. *The Design of Metal Halide Lamps for Space Station Freedom.* JIES, Summer 1993
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CIE:	Commission Internationale de l'Eclairage (International Commission on Illumination)
IEEE:	Institution of Electrical and Electronics Engineers
IESNA:	Illuminating Engineering Society of North America
ILE:	Institution of Lighting Engineers (UK)
JIES:	Journal of the Illuminating Engineering Society of North America
LD&A:	Lighting Design and Application
NCHRP:	National Cooperative Highway Research Program
SAE:	Society of Automotive Engineers
SANCI:	South African National Conference on Illumination
SID:	Society for Information Display
SPIE:	International Society of Optical Engineering

List of Patents Held

1. Refractive Grid lens. Optical grid for concentration of light from a lighting fixture, removing glare US patent no. 3,763,369
2. Fluorescent lens. Means of providing high efficiency control from fluorescent fixtures US patent no. 3, 988,609
3. Indirect luminaire. Reflector system for providing work plane illumination by reflecting light from room surfaces US patent no. 4,065,667
4. Optical coatings for illumination systems US patent no. 4,173,778
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6. Optical coatings for illumination systems US patent no. 4,310,876
7. Optical coatings for illumination systems. Four patents covering unique applications for control of visible and infra-red radiation in high efficiency optical systems US Patent no. 4,081-667
8. High Intensity Discharge reflector system for ambient lighting US patent no. 4,229,782
9. High Intensity Discharge reflector system for ambient lighting with cut off US patent no. 4,344,111
10. Lens for control of High Intensity Discharge lamp US patent no. 4,262,326
11. Fluorescent indirect luminaire 4,388,675
12. Forward throw optical system US patent no. 4,383,289
13. Segmented luminaire. Refractor/reflector system for providing adjustable lighting patterns US patent no. 4,575,788
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15. Wall mounted luminaire. High efficiency wall mounted area lighting system US patent no. 4,559,587
16. Wall wash lighting system. Luminaire for even illumination of vertical surfaces US patent no. 4,564,888
17. Glare reducing lens. An improved lens system for reducing glare and providing improved lamp hiding power US patent no. 4,703,405
18. Lens/Louver combination for interior lighting US patent no. 5,149,191
19. Portable traffic signal photometer US patent no. 5,185,637
20. Wall and ceiling lighting unit US patent no. 5,278,737
21. Improved floodlight reflector US patent no. 4,709,312
22. High efficiency specular louver US patent no. 4,059,754

Expert Witness Services

25 years of experience working for plaintiff and defense, including numerous depositions. State and federal court testimony.

Consulting, visibility reconstruction, light measurement, standards interpretation. Prior art research and patent validity analysis. Scientific and technical matters related to light, vision and lighting equipment.

Casework includes:

Traffic accidents: pedestrians, bicycles, automobiles, tractor-trailers

Trip and fall accidents

Assault and murder

Photography and visibility representation

Patent infringement

Restriction of trade

Breach of contract

References and details of recent casework available on request.

STATEMENT OF IAN LEWIN

EXHIBIT B

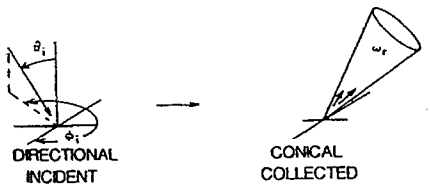
8TH EDITION

LIGHTING HANDBOOK

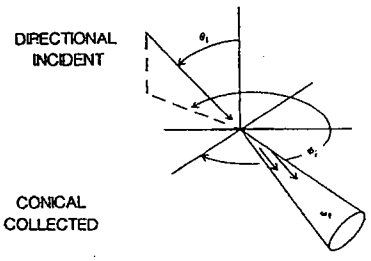
REFERENCE & APPLICATION

ILLUMINATING ENGINEERING SOCIETY
OF NORTH AMERICA

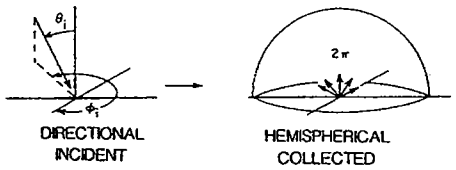
directional-conical reflectance, $\rho(\theta_i, \phi_i; \omega_r)$ the ratio of reflected flux collected through a conical solid angle to essentially collimated incident flux.
Note The direction of incidence must be specified, as must the direction and extent of the cone.



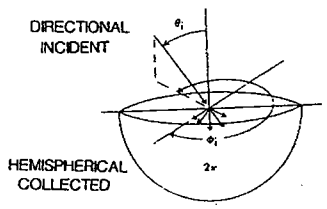
directional-conical transmittance, $\tau(\theta_i, \phi_i; \omega_r)$ the ratio of transmitted flux collected through a conical solid angle to essentially collimated incident flux.
Note The direction of incidence must be specified, as must the direction and extent of the cone.



directional-hemispherical reflectance, $\rho(\theta_i, \phi_i; 2\pi)$ the ratio of reflected flux collected over the entire hemisphere to essentially collimated incident flux.
Note The direction of incidence must be specified.



directional-hemispherical transmittance, $\tau(\theta_i, \phi_i; 2\pi)$ the ratio of transmitted flux collected over the entire hemisphere to essentially collimated incident flux.
Note The direction of incidence must be specified.



directional lighting lighting provided on the workplane or on an object predominantly from a preferred direction. See *accent lighting*, *key light* and *cross light*.

disability glare the effect of stray light in the eye whereby visibility and visual performance are reduced. A direct glare source that produces discomfort may also produce disability glare by introducing a measurable amount of stray light in the eye.

disability glare factor (DGF) a measure of the visibility of a task in a given lighting installation in comparison with its visibility under reference lighting conditions, expressed in terms of the ratio of luminance contrasts having an equivalent effect upon task visibility. The definition of the DGF takes account of the equivalent veiling luminance produced in the eye by the pattern of luminances in the task surround.

discomfort glare glare producing discomfort. It does not necessarily interfere with visual performance or visibility.

discomfort glare factor the numerical assessment of the capacity of a single source of brightness, such as a luminaire, in a given visual environment for producing discomfort (this term is obsolete and is retained only for reference and literature searches). See *glare* and *discomfort glare*.

discomfort glare rating (DGR) a numerical assessment of the capacity of a number of sources of luminance, such as luminaires, in a given visual environment for producing discomfort. It is the net effect of the individual values of the index of sensation for all luminous areas in the field of view. See *discomfort glare factor*. See also chapter 9, Lighting Calculations.

distal stimuli any of the points, lines and surfaces and three-dimensional arrays of scattering particles which one can identify in the physical space in front of the eye and which form optical images on the retina. Each element of a surface or volume to which an eye is exposed subtends a solid angle at the entrance pupil. Such elements of solid angle make up the field of view, and each has a specifiable luminance and chromaticity. Points and lines are specific cases which have to be dealt with in terms of total intensity and intensity per unit length.

distribution temperature (of a light source) the absolute temperature of a blackbody whose relative spectral distribution is most nearly the same in the visible region of the spectrum as that of the light source.

dominant wavelength (of a light), λ_d the wavelength of radiant energy of a single frequency that, when combined in suitable proportion with the radiant energy of a reference standard, matches the color of the light. See *complementary wavelength*.

downlight a small direct lighting unit which directs the light downward and can be recessed, surface mounted or suspended.

downward component that portion of the luminous flux from a luminaire emitted at angles below the horizontal. See *upward component*.

driving beam See *upper (driving) beams*.

dual headlighting system headlighting by means of two double units, one mounted on each side of the front end of a vehicle. Each unit consists of two sealed beam lamps mounted in a single housing. The upper or outer lamps may have two filaments supplying the lower beam and part of the upper beam, respectively. The lower or inner lamps have one filament providing the primary source of light for the upper beam.

solid angles. These concepts must be applied with care if the area of the transmitting element is not large compared to its thickness, in view of internal transmission across the boundary of the area. For many geometrically specified transmittance properties it is assumed that the radiance (luminance) is isotropic over the specified solid angle of incidence. Otherwise, the property is a function of the directional distribution of incident radiance (luminance) as well as the beam geometry and the character of the transmitting surfaces or media. Most transmittance quantities are applicable only to the transmittance of thin films with negligible internal scattering, so that the transmitted radiation emerges from a point that is not significantly separated from the point of incidence of the incident ray that produces the transmitted ray or rays. The governing considerations are similar to those for application of the bidirectional reflectance distribution function (BRDF), rather than the bidirectional scattering-surface reflectance distribution function (BSSRDF).

transverse roadway line (TRL) any line across a roadway that is perpendicular to the curb line.

tristimulus values of a light, X, Y, Z the amounts of each of three specific primaries required to match the color of the light.

troffer a recessed lighting unit, usually long and installed with the opening flush with the ceiling. The term is derived from "trough" and "coffer."

troland a unit of retinal illuminance which is based upon the fact that retinal illuminance is proportional to the product of the luminance of the distal stimulus and the area of entrance pupil. One troland is the retinal illuminance produced when the luminance of the distal stimulus is 1 cd/m^2 and the area of the pupil is 1 mm^2.

Note The troland makes no allowance for interocular attenuation or for the Stiles-Crawford effect.

tube See *lamp*.

tungsten-halogen lamp a gas-filled tungsten incandescent lamp containing a certain proportion of halogens in an inert gas whose pressure exceeds 3 atm.

Note The tungsten-iodine lamp (U.K.) and quartz iodine lamp (U.S.) belong to this category.

turn signal operating unit that part of a signal system by which the operator of a vehicle indicates the direction a turn will be made, usually by a flashing light.

U

ultraviolet lamp a lamp which radiates a significant portion of its radiative power in the ultraviolet (UV) part of the spectrum; the visible radiation is not of principal interest.

ultraviolet radiation for practical purposes any radiant energy within the wavelength range 10–380 nm. See *regions of the electromagnetic spectrum*.

Note On the basis of practical applications and the effect obtained, the ultraviolet region often is divided into the following bands:

Ozone-producing	180–220 nm
Bactericidal (germicidal)	220–300 nm
Erythemal	280–320 nm

There are no sharp demarcations between these bands, the indicated effects usually being produced to a lesser extent by longer and shorter wavelengths. For engineering purposes, the "black light" region extends slightly into the visible portion of the spectrum. Another division of the ultraviolet spectrum often used by photobiologists is given by the CIE:

UV-A	315–400 nm
UV-B	280–315 nm
UV-C	100–280 nm

units of luminance† the luminance of a surface in a specified direction may be expressed as luminous intensity per unit of projected area of surface or as luminous flux per unit of solid angle and per unit of projected surface area.

Note Typical units are the cd/m^2 [$lm/(sr \cdot m^2)$] and the cd/ft^2 [$lm/(sr \cdot ft^2)$]. The luminance of a surface in a specified direction is also expressed (incorrectly) in lambertian units as the number of lumens per unit area that would leave the surface *if the luminance in all directions within the hemisphere on the side of the surface being considered were the same as the luminance in the specified direction*. A typical unit in this system is the footlambert (fL), equal to 1 lm/ft^2. This method of specifying luminance is equivalent to stating the number of lumens that would leave the surface *if the surface were replaced by a perfectly diffusing surface with a luminance in all directions within the hemisphere equal to the luminance of the actual surface in the direction specified*. In practice no surface follows exactly the cosine formula of emission or reflection; hence the luminance is not uniform, but varies with the angle from which it is viewed. For this reason, this practice is denigrated.

unrecoverable light loss factors See *nonrecoverable light loss factors*.

upper (driving) beams one or more beams intended for distant illumination and for use on the open highway when not meeting other vehicles. Formerly "country beams." See *lower (passing) beams*.

upward component that portion of the luminous flux from a luminaire emitted at angles above the horizontal. See *downward component*.

utilance See *room utilization factor*.

V

vacuum lamp an incandescent lamp in which the filament operates in an evacuated bulb.

valance a longitudinal shielding member mounted across the top of a window or along a wall and usually parallel to the wall, to conceal light sources giving both upward and downward distributions.

valance lighting lighting comprising light sources shielded by a panel parallel to the wall at the top of a window.

values of spectral luminous efficiency for photopic vision, V(l) values for spectral luminous efficiency at 10-nm intervals (see chapter 1, Light and Optics) were provisionally adopted by the CIE in 1924 and were adopted in 1933 by the International Committee on Weights and Measures as a basis for the establishment of photometric standards of types of sources differing from the primary standard in

STATEMENT OF IAN LEWIN

EXHIBIT C

June 19, 1951 N. J. McDAID 2,557,129

SPOTLIGHTING UNIT

Filed June 1, 1948

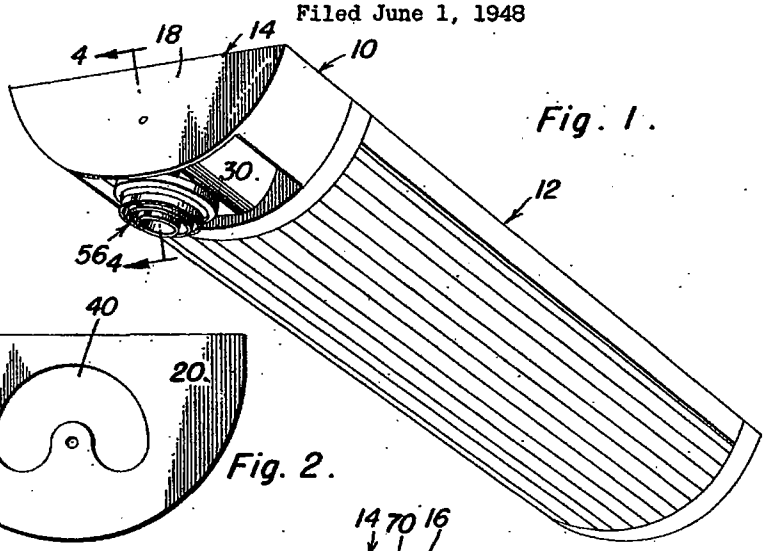


Fig. 1.

Fig. 2.

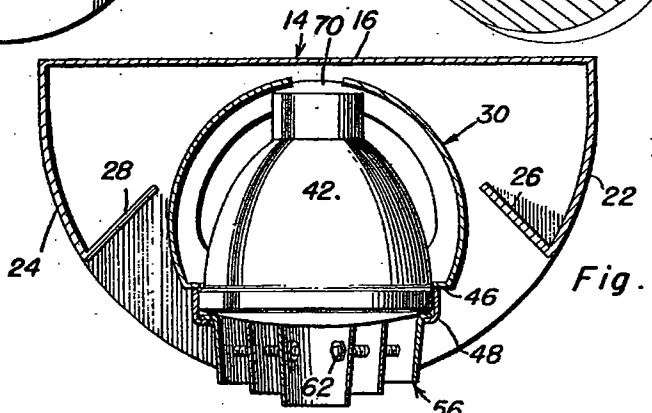


Fig. 3.

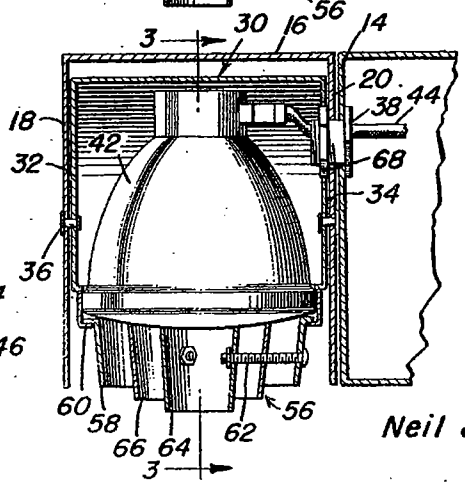
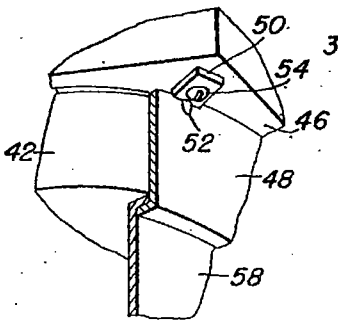


Fig. 4.

Fig. 5.



Neil J. McDaid
INVENTOR.

BY Clarence A. O'Brien and Harvey B. Jacobson
Attorneys

Patented June 19, 1951 2,557,129

UNITED STATES PATENT OFFICE

2,557,129

SPOT LIGHTING UNIT

Neil J. McDaid, Charleston, S. C., assignor of ten per cent to Toole-Woodward Engineering Company, Charleston, S. C.

Application June 1, 1948, Serial No. 30,492

1 Claim. (Cl. 240—78)

1

This invention relates generally to new and useful improvements in spotlighting fixtures and has for its primary object to provide a novel and compact spotlighting fixture, which is adapted for attachment to a suspension or ceiling type fixture.

Another important object of this invention is to provide a spotlighting fixture for use in association with a ceiling type fixture, the spotlighting fixture being easily and conveniently installed on the ceiling type fixture, in operative association therewith.

Another object of this invention is to provide a spotlight unit, which is adapted for attachment to a suspension or ceiling type fixture and which is pivotally installed thereon, so as to be adjustable and to project its beam in various selected directions.

A meritorious feature of this invention resides in the provision of a pivotally mounted spotlighting fixture, which is pivotally installed on a ceiling type fixture, so that the spotlight can be readily and easily focussed in any desired direction from the floor by any suitable long instrument.

Another meritorious feature of this invention resides in the provision of an outer shell, which is rigidly secured to one end of a fluorescent luminary or to any type of suspension type fixture and which is adapted to pivotally house an inner shell, the inner shell serving to support a lamp.

Another important feature of this invention resides in the provision of means for mounting the outer shell to the end of a fluorescent luminary or the like suspension type fixture, the securing or mounting means serving as a communicating means for wiring a spotlight in the main light or fixture circuit.

These and ancillary objects and other meritorious features are attained by this invention, a preferred embodiment of which is set forth in the following description and illustrated in the accompanying drawings, wherein:

Figure 1 is a view in perspective of a fluorescent luminary, showing this invention in operative attachment thereto;

Figure 2 is a side elevational view of one side of the outer shell;

Figure 3 is a vertical longitudinal sectional view of this invention as taken substantially along the plane of line 3—3 in Figure 4;

Figure 4 is a vertical transverse sectional view of this invention as taken substantially along the plane of line 4—4 in Figure 1, and

2

Figure 5 is an enlarged fragmentary view of the means provided for attaching a lamp supporting ring to the inner shell.

Referring now more particularly to the drawings, wherein similar characters of reference designate corresponding parts throughout, this invention, generally designated by the character reference 10, is shown in operative attachment with a conventional fluorescent luminary 12. However, it is to be noted that this invention is adaptable for use in association with any type of suspension or ceiling type fixture, the same being shown in the drawings by way of example only.

The fluorescent luminary 12 has a pair of opposed depending arcuate ends 14, to which this invention may be easily attached, either on one or both ends, as desired. The semi-circular end caps 14 of the fluorescent luminaries may be utilized, depending upon the spotlighting requirements of the establishment. In the case where only one unit is attached, the unsummetrical effect of the added unit will not be easily noticed, due to the small over-all length of the spotlighting unit 10, as compared to the large length of the fluorescent luminary.

This invention comprises an outer shell 14, having a rectangular top 16 and semi-circular or arcuate end caps 18 and 20, which depend therefrom. Opposed arcuately inturned end sections 22 and 24 terminate in upwardly extending baffles 26 and 28. Pivotally mounted within the outer shell 14 is an inner shell 30. The inner shell 30 is of a substantially similar shape, having opposed arcuate sides 32 and 34. The sides 32 and 34 are riveted to the sides 18 and 20 of the outer shell, as at 36. However, it is to be apparent that similar or other pivotal attaching means may be employed for securing the two shells together, so that the inner shell is capable of defining an arcuate path of travel within the outer shell, the outer shell being rigidly attached to the fluorescent luminary or ceiling fixture. Suitable means may be provided for securing the spotlighting unit 10 to the end cap 14 of the fluorescent luminary and comprises a nipple 38, which rigidly secures the end cap 20 to the end of the luminary, the nipple being inserted in a knockout area 40. However, an arcuate slot or guide-way 68 is formed in the side 34 of the inner shell, the projected end of the nipple travelling within the slot or guide-way 68.

Means is provided for mounting a conventional lamp 42 within the inner shell, the lamp 42 being wired in the circuit of the fluorescent luminary through the medium of a lead wire 44. The

conducting or lead wire 44 extends through the nipple 38, as shown in Figure 4 of the drawings. The means preferred for mounting the lamp comprises the formation of a circular opening in the substantially flat bottom portion of the inner shell 30, the opening defining an inwardly directed flange 46 on the bottom of the inner shell. A lamp supporting ring 48 is suitably secured to the flange 46 of the inner shell by any suitable securing or attachment means. By way of example, an angle clip 50 has one side 52 welded to the ring 48, the opposite side of the angle clip having an attaching aperture 54. Metal screws are employed in association with the attaching apertures 54 and suitable apertures formed in the flange 46 to secure the clip to the inner shell.

A plurality of nested louvres 56 are carried by the supporting ring 48 and disposed in vertical alignment with the seated lens face of the lamp 42. The outer louvre 58 has an attaching flange 60, which is seated on the inwardly directed flanged end of the lamp supporting ring 48. Suitable securing means 62 is provided to attach the circular inner nested louvres 66 and 64 to the outer supporting louvre 58, as shown more particularly in Figures 3 and 4 of the drawings.

Thus, it can be seen that the inner shell 30 is free to turn forty-five degrees, right or left, on a horizontal axis. Suitable control means for accomplishing the adjustment of the beam direction may be employed and preferably, would be employed by a person from a floor supported position. A stick or pole or similar instrument may be employed to exert pressure on one side of the inner shell, until the desired angle is obtained. No mechanical stop or locking device is required to hold the lamp at the desired angle, as the center of gravity pivot of the inner shell enables the entire inner assembly to be swung back and forth very easily and conveniently, the construction requiring but a bare minimum of tension in order to remain in the position it is placed.

In order to allow the heat emanating from the lamp to be exhausted into the outer shell, an opening 70 is formed in the top portion of the inner shell defining a communicating passage between the inner and outer shell.

Thus, it can be appreciated that there has been provided a compact and efficient attachment for a suspension type fixture, of fluorescent or other structure, which can be easily and conveniently adjusted from a floor position and which, in such adjustment, will remain fixed in the adjusted position.

However, since many other purposes and objects of this invention will become apparent to those skilled in the art, upon a perusal of the foregoing description, in view of the accompanying drawings, it is to be understood that certain changes may be effected thereon, as coming within the spirit of the invention and the scope of the appended claim.

Having described the invention what is claimed as new is:

A spotlight fixture adapted for attachment to a ceiling light fixture comprising an outer shell, said outer shell including a rectangular top plate, extending opposed arcuate sides and arcuately inturned ends, an inner shell, of similar shape pivotally mounted to the sides of the outer shell, baffles formed on the ends of the outer shell and projecting upwardly between the shells, a circular ring secured to the open end of the inner shell, a lamp disposed within the inner shell and having a lens face seated on the ring, nested louvres suspended from the ring in vertical alignment with the lens face of the lamp, aligned openings in one of the sides of the shells, means disposed in the openings for attaching the shells to a ceiling light fixture, said inner shell being movable about the attaching means and an opening in the inner shell for exhausting heat into the outer shell.

NEIL J. McDAID.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,498,580	Rule	June 24, 1924
2,022,222	Sullivan	Nov. 26, 1935
2,063,744	Kramer	Dec. 8, 1936
2,152,197	Levy	Mar. 28, 1939
2,300,523	Reichert	Nov. 3, 1942
2,313,131	Elias	Mar. 9, 1943

STATEMENT OF IAN LEWIN

EXHIBIT D

United States Patent [19]

Miller

[11] **Patent Number: 4,816,969**

[45] **Date of Patent: Mar. 28, 1989**

[54] **WALL-MOUNTED OVER-BED LIGHTING FIXTURE**

[75] Inventor: **David H. Miller, Walnut Creek, Calif.**

[73] Assignee: **Hospital Systems Inc., Oakland, Calif.**

[21] Appl. No.: **149,473**

[22] Filed: **Feb. 5, 1988**

[51] **Int. Cl.**[4] **A47B 23/06**

[52] **U.S. Cl.** **362/130**; 362/801; 362/282; 362/287; 362/394

[58] **Field of Search** 362/130, 147, 223, 224, 362/225, 217, 234, 244, 245, 260, 277, 282, 283, 319, 322, 285, 287, 801, 35, 455, 394, 269, 275; 128/23

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1,906,626	5/1933	Kramer	362/130
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FOREIGN PATENT DOCUMENTS

110770	12/1939	Australia	362/130
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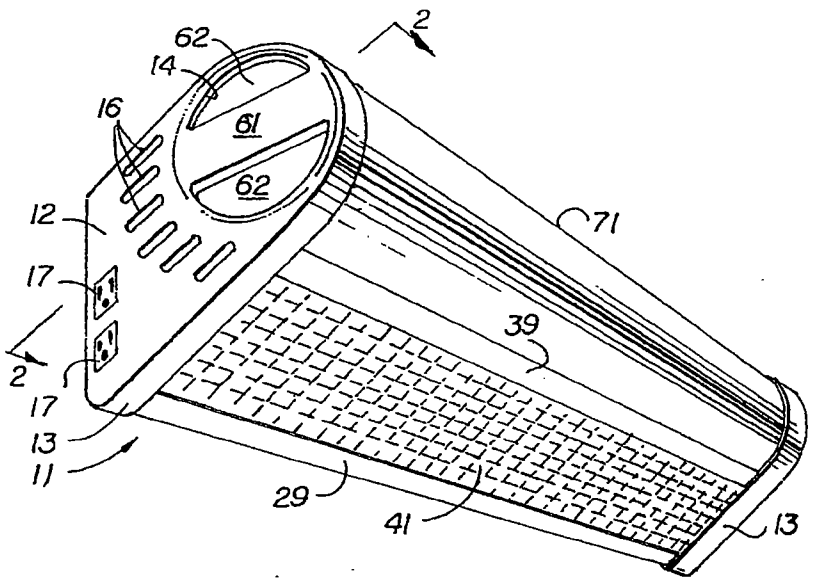
Primary Examiner—Michael Koczo
Assistant Examiner—D. M. Cox
Attorney, Agent, or Firm—Julian Caplan

[57] **ABSTRACT**

The housing for the fixture is mounted on a wall over the patient's bed. The housing accommodates a first non-rotatable fixture which directs light from fluorescent tubes downward through a conventional flat prismatic lens. There is also a longitudinally extending lens mounted within the outline of the housing and rotatable by means of handles at either end so that light from a second set of fluorescent tubes may be adjusted to function as a reading lamp for the patient, as an examining light at different locations of the patient's body and as a room illumination source, the intensity of room illumination being adjustable. A safety switch is moved to "off" position when the housing is struck by an object such as an IV rod fixed to an adjustable bed to stop the motor which moves the bed.

11 Claims, 3 Drawing Sheets



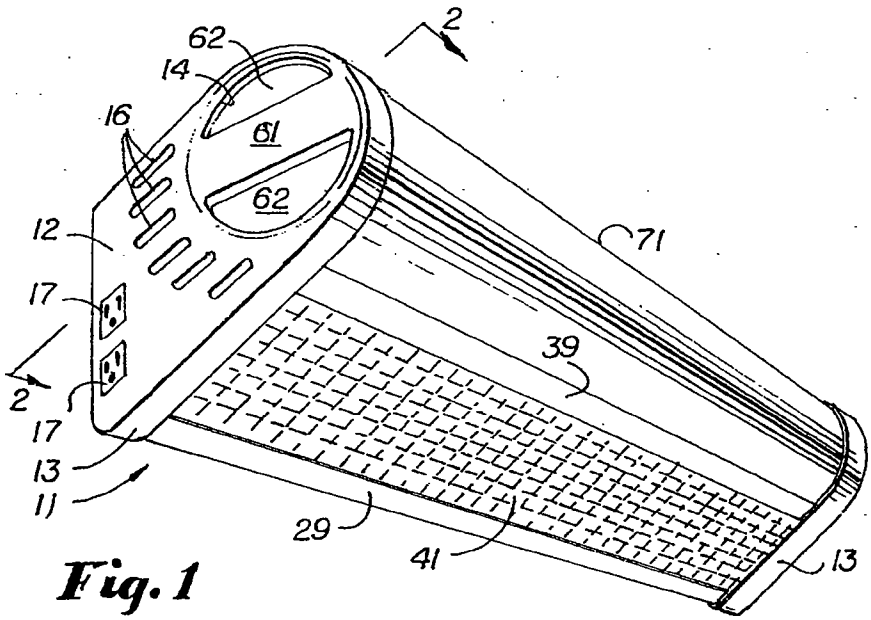


Fig. 1

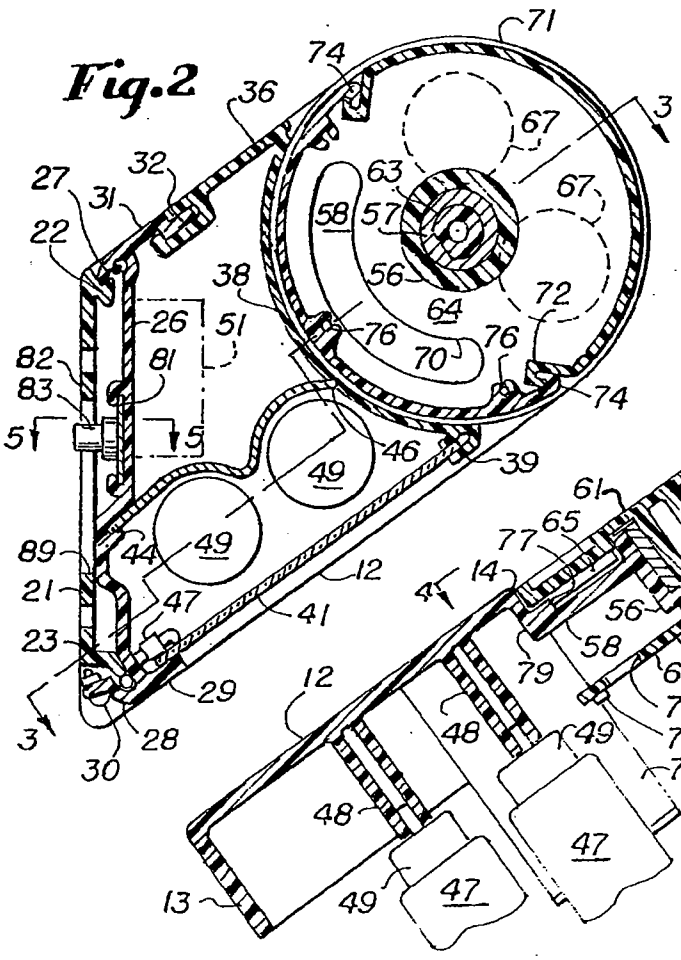


Fig.2

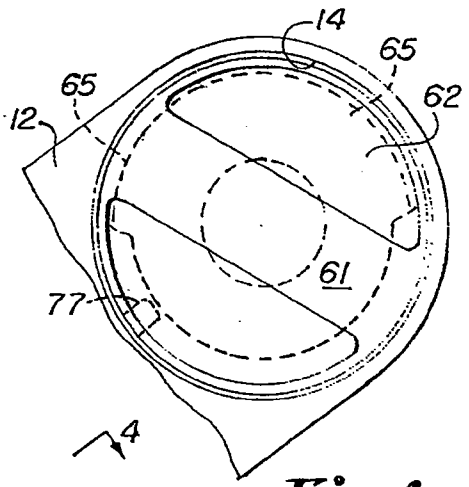


Fig.4

Fig. 3

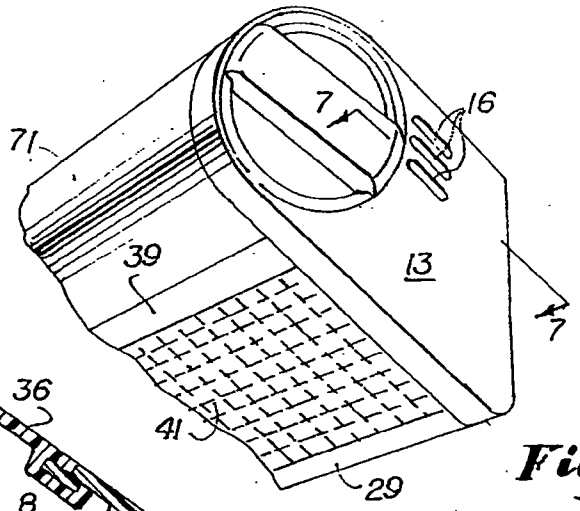


Fig.6

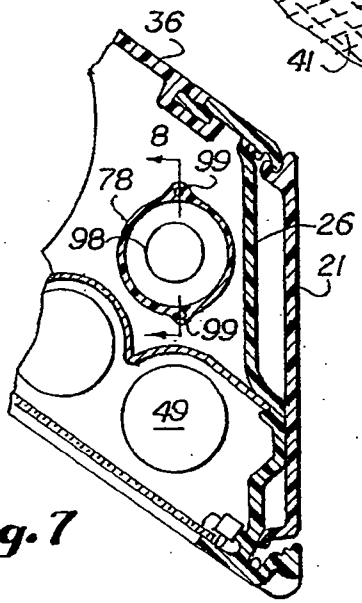


Fig.7

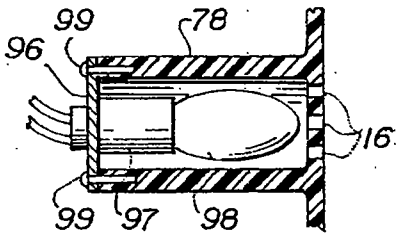


Fig.8

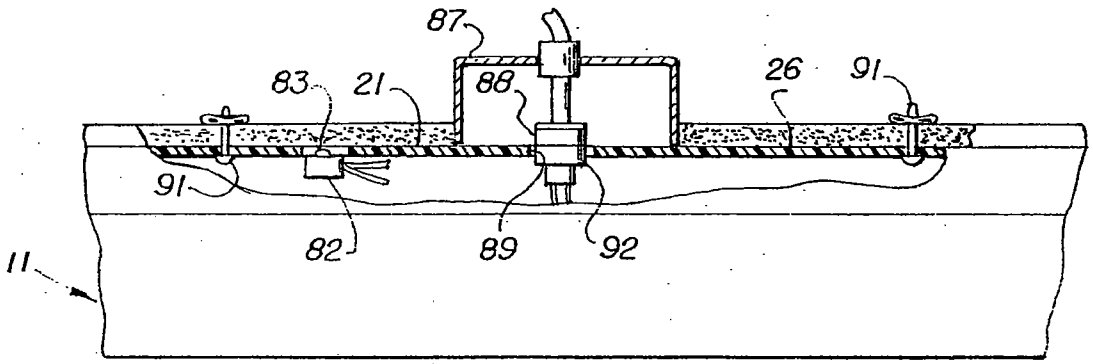


Fig.5

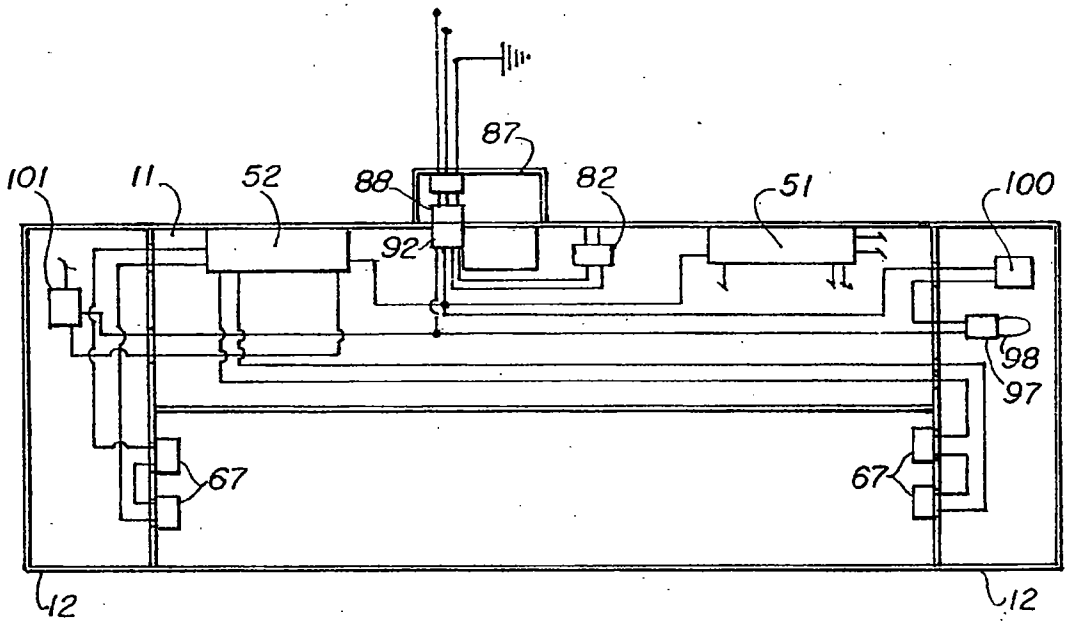

101
11
52
88
87
82
51
100
92
98
97
67
67
12
12

Fig.9

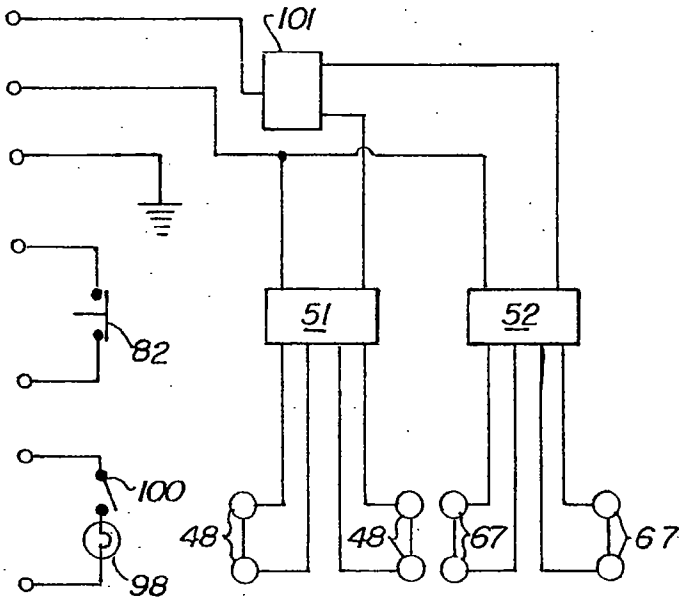

101
51
52
82
100
98
48
48
67
67

Fig.10

WALL-MOUNTED OVER-BED LIGHTING FIXTURE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a wall-mounted over-bed hospital lighting fixture of the type which provides illumination of the head of the bed and is characterized by the provision of a rotatable lamp incorporated in the housing of the device which may be used as a patient reading lamp, as a physician's examining lamp and also as a variable room illumination lamp.

2. Description of Related Art

Wall-mounted bed lighting fixtures are well known in the art. Such fixtures generally have a horizontal flat prismatic lens through which illumination from the interior of the housing is directed to the head of the bed which is mounted immediately therebeneath. The provision of patient examining lights and reading lamps which are mounted on the wall is also well known.

The present invention differs from prior fixtures in that both lighting fixtures are totally enclosed within a wall-mounted housing.

U.S. Pat. No. 3,919,540 discloses a safety light with a switch responsive to interfering movement of an IV rod, or the like, which interrupts power to a bed-elevating motor. U.S. Pat. No. 4,149,222 shows a pivotal wall mounting for a bed light wherein the fixture is hinged to a mounting plate with a leaf hinge. The present invention provides an improved pivotal mounting which does not require a leaf hinge and is more easily installed than prior fixtures of this type. A room may be completely finished and painted before the fixture is set into place, preventing damage to the paint or to the fixture. The bracket then serves as an integral part of the safety interlock.

SUMMARY OF THE INVENTION

A single housing preferably formed of interfitting extrusions is provided which is mounted extending longitudinally horizontally on the wall above a bed and is used in hospitals, nursing homes and the like. On the bottom of the housing is a flat, horizontal, prismatic lens which directs illumination from one or more fluorescent tubes downward to illuminate the head of the bed.

Also mounted on the upper portion of the housing is a rotatable two-part cylinder, one part being transparent and the other opaque and within the cylinder are one or more additional fluorescent lamps. By turning a handle at either end of the housing, the cylindrical member may be directed in various positions. Thus, it may be directed to provide a patient reading lamp. It may also be adjusted so that it illuminates any portion of the bed and may be used by a physician or nurse as an examining lamp. Additionally, the transparent portion of the lamp may be directed toward the ceiling or any portion of the room to provide room illumination. Particularly in connection with the latter function, the amount of illumination may be controlled by exposing or concealing within the housing varying portions of the transparent part of the rotatable member.

The housing may also contain a night light which shines through louvers in the end cap of the housing.

Another feature of the invention is the fact that all of the rotatable elements including the handles which turn the rotatable member are at all times within the outline of the housing so that in none of its various positions of adjustment does the lamp extend outside the outline of the housing.

An advantage of the invention is the fact that, regardless of the position of adjustment of the rotatable lamp, it is always within the confines of the housing, thereby differing from those overhead reading lamps which are hinged or pivotted to the housing and in down position extend outside the housing.

Another advantage of the invention is that all wires for all lamps are contained within the housing and do not extend exteriorly thereof.

A still further feature of the invention is the provision of a safety interface comprising a switch which cuts off power to an adjustable bed or the like in the event that the bed or an upward-extending member attached to a bed comes in contact with the lighting fixture This safety feature prevents the hospital bed from being torn off the wall if it is wall-mounted and prevents damage to the housing of the fixture The mounting of the fixture to a plate attached to the wall is an improved feature of this invention.

FIGURES IN THE DRAWINGS

FIG. 1 is a perspective view of a fixture in accordance with the present invention.

FIG. 2 is a sectional view taken substantially along the line 2—2 of FIG. 1.

FIG. 3 is a sectional view taken substantially along the line 3—3 of FIG. 2.

FIG. 4 is a fragmentary enlarged end elevation as vised from the right of FIG. 3.

FIG. 5 is a fragmentary plan view showing the fixture mounted on a wall.

FIG. 6 is a perspective view of a portion of the device.

FIG. 7 is a fragmentary sectional view taken substantially along the line 7—7 of FIG. 6.

FIG. 8 is a sectional view along line 8—8 of FIG. 7.

FIG. 9 is a schematic wiring layout of electrical portions of the invention. FIG. 10 is a schemtic wiring diagram of the same.

DESCRIPTION OF PREFERRED EMBODIMENT

Housing 11 has end caps 12 at either end, each end cap 12 having an inward projecting relatively narrow rim 13. A circular hole 14 is formed in each end cap as are louvers 16. Sockets 17 may be recessed into the end caps for attachment of various appliances as desired.

Mounted within the housing 11 and within the confines of the end caps 12 is a longitudinally extending mounting bracket 21 which is fixed to a wall so that the housing 11 extends horizontally longitudinally above the bed. Wall 86 has a conventional junction box 87 recessed therein and extending outward therefrom is a first snap connector member 88. Bracket 21 has a knock-out hole 89 formed therein fitting over junction box 87. Bracket 21 is attached to wall 86 by screws 91. Along the top edge bracket 21 is a top interlock receptor 22 and along the bottom edge is a bottom interlock lug 23. Interfitting with bracket 21 is a longitudinally extending rear member 26 which has a top lug 27 received in receptor 22 and a bottom receptor 28 which receives bottom lug 23 in such manner that when an object such as an IV rod attached to a hospital bed strikes housing 11, rear member 21 pivots upward. Along the bottom of member 26 is an external flange 29 and along the top is a top flange 31 which is formed at

its outer end with an internally offset lug 32. Screws 30 recessed in the lower part of the fixture are tightened to an extent to allow pivoting of top lug 27 on receptor 22 but still contain relative movement to prevent housing 11 from coming away from wall 86. Second snap connector member 92 mates with connector 88 when the members are assembled to supply power to the fixture.

Top member 36 has a top receptor 37 which receives lug 32 so that the members 31 and 26 comprise essentially a unit. Preferably top member 36 extends at an obtuse angle relative to member 21 and at its forward end is formed in an arcuate portion 38. The lower end of arcuate portion 38 comprises a bottom receptor 39. Mounted on the bottom of the housing is a flat prismatic lens 41 which is disposed approximately parallel to the top member 36. The upper end or outer edge of lens 41 is received in receptor 39 and its lower or inner edge is held by an edge clamp 42 connected to external flange 29 of rear member 26. The lens 41 may be removed by release of clamp 42. Above lens 41 is a reflector 43 the edges of which are received in receptors 44 and 46 in rear member 26 and arcuate portion 38, respectively. Fluorescent tubes 47 are held in place by inward extensions 4 end caps 12, the sockets 49 for the tubes 47 in threaded engagement with the hollow extensions 48. It will be understood that the shape of reflector 43 is such as to direct the illumination from the tubes 47 outward through the lens 41. Ballast 51 for tubes 47, shown schematically in FIG. 2, is mounted in the space above the reflectors 43. Various lengths of housing 11 may be used and the proper length tube 47 is chosen for a particular length housing.

Concentric with the center of curvature of arcuate portion 38 is a bearing hub 56 which is integral with end cap 12 and is connected to the end portion thereof by a web 58 and to the upper rim portion 13 thereof by web 59. Within the hub 56 is sleeve bearing 57. It will be noted that the webs 58 and 59 are recessed and fitting within the recess is a rotation handle or knob 61 formed with depressions 62 so that it may be conveniently gripped by a physician, nurse or other attendant to turn the handle 61. Fitting through sleeve bearing 57 is a hollow stem 63 which is an inward extension of handle 61. The inner end of stem 63 is formed non-circular with a flat 69 (see FIG. 4) and is received within an appropriate hole in mounting disk 64. A retaining ring 66 secures the stem 63 and disk 64 together. Attached to disk 64 are one or more sockets 67 to receive fluorescent tubes 68, preferably of the same length as tubes 47. A slot 70 here shown to be arcuate is formed in disk 64 for passage of wiring from the ballast 52 to the sockets 67. Ballast 52 is likewise within housing 11.

A transparent substantially semi-cylindrical rotatable lens 71 is provided having receptors 72 at either edge. Interfitting with lens 71 is a rotatable lens mounting 73 having at either edge lugs 74 which fit into the receptors 72. The members 71 and 73 comprise a cylindrical longitudinally extending member and attachment ears 76 are used to secure the mounting 73 to the disks 64. Arcuate portion 38, handle 61, stem 63, disk 64, lens 71, and lens mounting 73 all have a common center of curvature.

Stops 77 are inserted in wall 79 of opening 14 in cap 12. Handle 61 has a projection 65 which intersects stops 77 and limit the oscillatory movement of lens 71 to less than 360°.

One feature of the invention is the fact that the parts may largely be formed of aluminum alloy extrusions, thereby making the cost of construction relatively inexpensive.

A safety feature of the invention is the provision of a switch which may be opened if a hospital bed or the orthopedic frame above such a bed or an IV rod attached to the bed comes in contact with the fixture. Thus a mounting plate 81 is installed in a suitable socket in the rear member 26. A switch button 83 bears against the mounting bracket 21. If, due to distortion of the housing 11 by reason of contact with a bed or frame above a bed, the button 83 is pressed inward to open the circuit. Switch 82 may be used to discontinue power to the bed operating motor, to sound an alarm or for other purposes.

The fluorescent tubes 47 which provide illumination through the lens 41 illuminate the head of the bed in normal fashion. However, by rotating the handle 61, the transparent rotatable lens 71 may be adjusted in position so that it shines down to provide a reading lamp for the patient or may be turned so that it illuminates any portion of the patient's body for purpose of examination. The lens 71 may be turned upward so that indirect illumination of the room is provided and the degree of such illumination may be adjusted by the relative proportions of the transparent lens 71 and opaque mounting 73 which are exposed outside the arcuate portion 38.

For night-light purposes, a sub housing 78 is formed in end cap 12 adjacent louvers 16. A mounting plate 96 carries socket 97 for lamp 88. Plate 96 is attached to the inner open end of sub-housing 78 by screws 99. Light from lamp 98 shines out through louvers 16.

As previously stated, all wiring is confined within the housing 11. The wiring diagram for the fluorescent lamps 47 and 68 and for switch 82 is shown in FIG. 10. FIG. 9 shows schematically how the wiring and ballasts 51, 52 are disposed within the housing. A four-position switch 101 controls current entering the system from connector 92 to ballasts 51 and 52 for lamps 47 and 68, respectively, so that either set of lamps or both or neither may be illuminated by adjustment of switch 101, which is accessible from the exterior through an opening (not shown) in one of end caps 12. A toggle switch 100, also accessible from the exterior, controls night lamp 98.

What is claimed is:

1. An over-bed hospital lighting fixture comprising a longitudinally disposed housing having mounting means for mounting said housing on a wall,

end caps on either end of said housing formed with aligned circular openings,

a cylindrically arcuate member positioned in said housing outward of said mounting means and transverse to said end caps having its center of curvature substantially co-extensive with the center of curvature of said circular openings and disposed longitudinally of said housing,

a substantially semi-cylindrical, substantially opaque lens mounting rotatable about an axis concentric with said center of curvature and having first connecting means along its longitudinal edges,

a substantially semi-cylindrical, transparent lens with its axis substantially co-extensive with said center of curvature and having second connecting means along its longitudinal edges cooperable with said first connecting means to combine said lens mounting and said lens as a cylindrical unit,

a pair of mounting disks connected adjacent either end of said housing for rotation with said cylindri-

cal unit and having light sockets to receive light bulbs,

a handle at at least one end of said housing having a shaft passing through said circular opening and connected for rotation with said lens mounting, said lens and said mounting disk,

whereby by turning said handle the relative amount of light passing out of said housing through said lens may be adjusted.

2. A fixture according to claim 1 which further comprises a flat transparent bottom wall for said housing interposed between said mounting means and said arcuate member, a reflector inward of said bottom wall, lighting means between said reflector and said bottom wall and means for mounting said bottom wall, said reflector and said lighting means in said housing.

3. A fixture according to claim 2 in which said bottom wall comprises a substantially rectangular prismatic lens.

4. A fixture according to claim 3 in which said lighting means comprises longitudinally disposed fluorescent tubes.

5. A fixture according to claim 1 which further comprises a fluorescent tube longitudinally disposed in said housing having its opposite ends received in said sockets of said disks.

6. A fixture according to claim 1 in which each said end cap is formed with an indented annular web having a bearing housing concentric with said axis, said handle being recessed in said annular web, said handle having a stem passing through said web and connected inside said web to one said disk and to said lens mounting and said lens.

7. A fixture according to claim 1 which further comprises a rear member within said housing normally disposed substantially parallel to said mounting means,

a safety limit switch carried by said rear member having a button resiliently biased outward toward a first position, said button being moved to a second position by said button engaging said mounting means when said rear member is disposed substantially parallel to said mounting means whereby force applied to said housing by an external object striking said housing causes said rear member to pivot outward away from said mounting means said button to move to first position, when said force is sufficient to damage said fixture or said external object.

8. A fixture according to claim 7 in which said mounting means is formed with a horizontal longitudinally extending interlock receptor along its top edge and said rear member is formed with a top lug fitting into said receptor so that said housing hangs from said receptor and may pivot upward relative to said mounting means.

9. A fixture according to claim 8 which further comprises adjustment screws in said housing engaging the bottom edge of said mounting means, said screws controlling the extent of pivotal movement of said rear member relative to said mounting means.

10. A fixture according to claim 8 in which said mounting means is formed with an opening for protrusion of a first electrical connector for power for said fixture, said housing having a second electrical connector mating with said first connector, whereby said fixture may be placed on a wall by first attaching said mounting means to said wall, then hanging said top lug on said receptor and engaging said first and second connectors and then pivoting said housing down so that said rear member is substantially flush with said mounting means.

11. A fixture according to claim 1 in which said arcuate member, opaque lens mounting, lens, and mounting disks are at all times confined within said housing regardless of the position of adjustment of said lens.

* * * * *

STATEMENT OF IAN LEWIN

EXHIBIT E

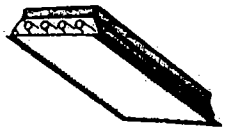
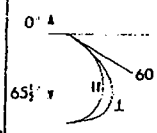
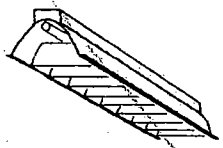
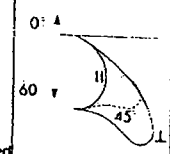
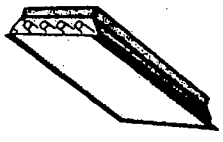
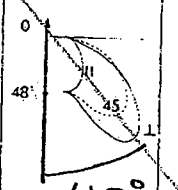
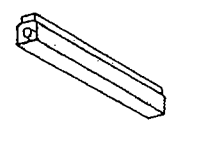
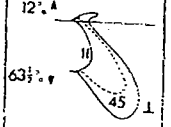
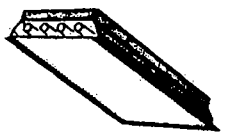
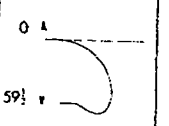
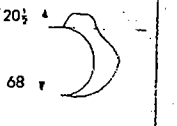
Fig. 9-34. *Continued*

Typical Luminaire	Typical Intensity Distribution and Per Cent Lamp Lumens	ρ_{CC} →	80			70			50			30			10			0	WDRC	ρ_{CC} →
		ρ_W →	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0		ρ_W →
	Maint. Cat. SC	RCR ↓	Coefficients of Utilization for 20 Per Cent Effective Floor Cavity Reflectance (ρ_{FC} = 20)																	RCR ↓
31	IV 1.5/1.2	0	.69	.69	.69	.67	.67	.67	.64	.64	.64	.62	.62	.62	.59	.59	.59	.58		
		1	.62	.61	.59	.61	.59	.58	.59	.57	.56	.57	.55	.54	.55	.54	.53	.52	.159	1
		2	.56	.53	.50	.55	.52	.50	.53	.50	.48	.51	.49	.47	.49	.48	.46	.45	.160	2
		3	.50	.46	.43	.49	.46	.43	.48	.44	.42	.46	.43	.41	.45	.42	.41	.39	.155	3
		4	.45	.41	.37	.44	.40	.37	.43	.39	.36	.42	.38	.36	.40	.38	.36	.34	.147	4
		5	.40	.36	.32	.40	.36	.32	.39	.35	.32	.38	.34	.32	.37	.34	.31	.30	.139	5
		6	.37	.32	.29	.36	.32	.28	.35	.31	.28	.34	.31	.28	.33	.30	.28	.27	.131	6
		7	.33	.29	.25	.33	.28	.25	.32	.28	.25	.31	.28	.25	.30	.27	.25	.24	.123	7
150 mm × 150 mm (6 × 6") cell parabolic wedge louver—multiply by 1.1 for 250 × 250 mm (10 × 10") cells		8	.30	.26	.23	.30	.26	.22	.29	.25	.22	.28	.25	.22	.28	.25	.22	.21	.115	8
		9	.28	.23	.20	.27	.23	.20	.27	.23	.20	.26	.23	.20	.26	.22	.20	.19	.109	9
		10	.26	.21	.18	.25	.21	.18	.25	.21	.18	.24	.21	.18	.24	.20	.18	.17	.102	10
32	I 1.3	0	1.02	1.02	1.02	.99	.99	.99	.92	.92	.92	.86	.86	.86	.81	.81	.81	.78		
		1	.85	.80	.76	.82	.78	.74	.76	.73	.70	.71	.68	.66	.67	.64	.62	.60	.467	1
		2	.72	.65	.59	.70	.63	.58	.65	.60	.55	.61	.56	.52	.57	.53	.50	.47	.387	2
		3	.63	.55	.48	.60	.53	.47	.56	.50	.45	.53	.47	.43	.49	.45	.41	.38	.331	3
		4	.55	.46	.40	.53	.45	.39	.50	.43	.37	.46	.41	.36	.43	.38	.34	.32	.289	4
		5	.49	.40	.34	.47	.39	.33	.44	.37	.32	.41	.35	.31	.39	.34	.29	.27	.255	5
		6	.43	.35	.29	.42	.34	.29	.40	.33	.28	.37	.31	.27	.35	.30	.26	.23	.228	6
2-lamp, surface mounted, bare lamp unit—photometry with 460 mm (18") wide panel above luminaire—lamps on 150 mm (6") centers		7	.39	.31	.25	.38	.30	.25	.36	.29	.24	.34	.28	.23	.32	.26	.22	.20	.206	7
		8	.36	.28	.22	.35	.27	.22	.33	.26	.21	.31	.25	.21	.29	.24	.20	.18	.188	8
		9	.33	.25	.20	.32	.25	.20	.30	.24	.19	.28	.23	.18	.27	.22	.18	.16	.173	9
		10	.30	.23	.18	.29	.22	.18	.28	.21	.17	.26	.21	.17	.25	.20	.16	.14	.159	10
33	VI N.A.	0	.77	.77	.77	.68	.68	.68	.50	.50	.50	.34	.34	.34	.19	.19	.19	.12		
		1	.67	.64	.61	.59	.56	.54	.43	.42	.41	.29	.29	.28	.17	.16	.16	.10	.048	1
		2	.58	.54	.50	.51	.48	.44	.38	.36	.34	.26	.24	.23	.14	.14	.13	.08	.045	2
		3	.51	.46	.42	.45	.41	.37	.33	.30	.28	.23	.21	.19	.13	.12	.11	.07	.041	3
		4	.45	.39	.35	.40	.35	.31	.30	.26	.24	.20	.18	.17	.11	.10	.10	.06	.037	4
		5	.40	.34	.30	.35	.30	.26	.26	.23	.20	.18	.16	.14	.10	.09	.08	.05	.034	5
		6	.36	.30	.25	.31	.26	.23	.24	.20	.17	.16	.14	.12	.09	.08	.07	.04	.031	6
		7	.32	.26	.22	.28	.23	.20	.21	.18	.15	.15	.12	.11	.08	.07	.06	.04	.028	7
		8	.29	.23	.19	.26	.21	.17	.19	.16	.13	.13	.11	.09	.08	.06	.06	.03	.026	8
Luminous bottom suspended unit with extra-high output lamp		9	.26	.21	.17	.23	.18	.15	.17	.14	.12	.12	.10	.08	.07	.06	.05	.03	.024	9
		10	.24	.19	.15	.21	.17	.13	.16	.13	.10	.11	.09	.07	.06	.05	.04	.03	.022	10
34	VI 1.4/1.2	0	.91	.91	.91	.85	.85	.85	.74	.74	.74	.64	.64	.64	.54	.54	.54	.50		
		1	.80	.77	.74	.75	.72	.70	.65	.63	.61	.57	.55	.54	.49	.47	.47	.43	.179	1
		2	.70	.65	.61	.66	.62	.58	.58	.54	.52	.50	.48	.46	.43	.42	.40	.37	.166	2
		3	.62	.56	.51	.58	.53	.49	.51	.47	.44	.45	.42	.39	.39	.37	.35	.32	.153	3
		4	.55	.49	.44	.52	.46	.42	.46	.41	.38	.40	.37	.34	.35	.32	.30	.27	.140	4
		5	.50	.43	.38	.47	.41	.36	.41	.37	.33	.36	.33	.30	.32	.29	.26	.24	.129	5
		6	.45	.38	.33	.42	.36	.32	.37	.33	.29	.33	.29	.26	.29	.26	.23	.21	.119	6
		7	.40	.34	.29	.38	.32	.28	.34	.29	.26	.30	.26	.23	.26	.23	.21	.19	.111	7
		8	.37	.30	.26	.35	.29	.25	.31	.26	.23	.28	.24	.21	.24	.21	.19	.17	.103	8
Prismatic bottom and sides, open top, 4-lamp suspended unit—see note 7		9	.34	.27	.23	.32	.26	.22	.29	.24	.21	.25	.22	.19	.22	.19	.17	.15	.096	9
		10	.31	.25	.21	.29	.24	.20	.26	.22	.19	.23	.20	.17	.21	.18	.15	.14	.090	10
35	V 1.5/1.2	0	.81	.81	.81	.78	.78	.78	.72	.72	.72	.66	.66	.66	.61	.61	.61	.59		
		1	.71	.68	.66	.68	.66	.63	.63	.61	.59	.58	.57	.56	.54	.53	.52	.50	.223	1
		2	.63	.58	.55	.60	.56	.53	.56	.53	.50	.52	.50	.47	.48	.46	.45	.43	.201	2
		3	.56	.50	.46	.54	.49	.45	.50	.46	.43	.47	.43	.41	.43	.41	.39	.37	.183	3
		4	.50	.44	.40	.48	.43	.39	.45	.40	.37	.42	.38	.35	.39	.36	.34	.32	.167	4
		5	.45	.39	.34	.43	.38	.34	.40	.36	.32	.38	.34	.31	.35	.32	.30	.28	.153	5
		6	.40	.34	.30	.39	.34	.30	.37	.32	.28	.34	.30	.27	.32	.29	.26	.25	.142	6
		7	.37	.31	.27	.35	.30	.26	.33	.29	.25	.31	.27	.24	.30	.26	.23	.22	.131	7
		8	.33	.28	.24	.32	.27	.23	.30	.26	.23	.29	.25	.22	.27	.24	.21	.20	.122	8
2-lamp prismatic wraparound—see note 7		9	.31	.25	.21	.30	.25	.21	.28	.24	.20	.26	.23	.20	.25	.22	.19	.18	.114	9
		10	.28	.23	.19	.27	.22	.19	.26	.21	.18	.24	.21	.18	.23	.20	.17	.16	.107	10
36	V 1.2	0	.82	.82	.82	.77	.77	.77	.69	.69	.69	.61	.61	.61	.53	.53	.53	.50		
		1	.71	.67	.65	.67	.64	.61	.59	.57	.55	.52	.51	.49	.46	.45	.44	.40	.234	1
		2	.62	.57	.53	.59	.54	.51	.52	.49	.46	.46	.44	.41	.41	.39	.37	.34	.194	2
		3	.55	.49	.45	.52	.47	.43	.46	.42	.39	.41	.38	.36	.37	.34	.32	.30	.168	3
		4	.49	.43	.39	.47	.41	.37	.42	.37	.34	.37	.34	.31	.33	.30	.28	.26	.150	4
		5	.44	.38	.34	.42	.36	.32	.38	.33	.30	.34	.30	.27	.30	.27	.25	.23	.135	5
		6	.40	.34	.29	.38	.32	.28	.34	.30	.26	.31	.27	.24	.28	.25	.22	.20	.123	6
		7	.36	.30	.26	.35	.29	.25	.31	.27	.23	.28	.25	.22	.25	.22	.20	.18	.112	7
		8	.33	.27	.23	.32	.26	.23	.29	.24	.21	.26	.22	.20	.23	.20	.18	.16	.104	8
2-lamp prismatic wraparound—see note 7		9	.30	.25	.21	.29	.24	.20	.26	.22	.19	.24	.20	.18	.22	.19	.16	.15	.097	9
		10	.28	.23	.19	.27	.22	.18	.25	.20	.17	.22	.19	.16	.20	.17	.15	.14	.090	10

STATEMENT OF IAN LEWIN

EXHIBIT F

Fig. 9-34. *Continued*

Typical Luminaire	Typical Intensity Distribution and Per Cent Lamp Lumens	Maint. Cat.	SC	RCR ↓	ρcc → 80			70			50			30			10			0	WDRC	RCR ↓
					ρw → 50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0		ρw →
					Coefficients of Utilization for 20 Per Cent Effective Floor Cavity Reflectance (ρ_{FC} = 20)																	
43  4-lamp, 610 mm (2') wide unit with sharp cutoff (high angle—low luminance) flat prismatic lens—see note 7		V	1.4/1.3	0	.78	.78	.78	.76	.76	.76	.73	.73	.73	.70	.70	.70	.67	.67	.67	.66		
				1	.71	.68	.66	.69	.67	.65	.66	.65	.63	.64	.63	.61	.62	.61	.60	.58	.181	1
				2	.63	.60	.57	.62	.59	.56	.60	.57	.55	.58	.56	.54	.56	.54	.52	.51	.180	2
				3	.57	.52	.49	.56	.52	.48	.54	.51	.48	.52	.49	.47	.51	.48	.46	.45	.173	3
				4	.51	.46	.43	.50	.46	.42	.49	.45	.42	.47	.44	.41	.46	.43	.41	.39	.164	4
				5	.46	.41	.37	.46	.41	.37	.44	.40	.37	.43	.39	.36	.42	.39	.36	.35	.154	5
				6	.42	.37	.33	.41	.37	.33	.40	.36	.33	.39	.35	.32	.38	.35	.32	.31	.145	6
				7	.38	.33	.29	.38	.33	.29	.37	.32	.29	.36	.32	.29	.35	.32	.29	.28	.136	7
				8	.35	.30	.26	.35	.30	.26	.34	.29	.26	.33	.29	.26	.32	.29	.26	.25	.127	8
				9	.32	.27	.24	.32	.27	.24	.31	.27	.24	.31	.27	.24	.30	.26	.24	.22	.120	9
				10	.30	.25	.22	.30	.25	.22	.29	.25	.22	.28	.24	.22	.28	.24	.21	.20	.113	10
44  Bilateral batwing distribution—louvered fluorescent unit		IV	N.A.	0	.71	.71	.71	.70	.70	.70	.66	.66	.66	.64	.64	.64	.61	.61	.61	.60		
				1	.64	.62	.60	.63	.61	.60	.60	.59	.58	.58	.57	.56	.56	.55	.54	.53	.167	1
				2	.57	.54	.51	.56	.53	.51	.54	.52	.50	.52	.50	.48	.51	.49	.47	.46	.170	2
				3	.51	.47	.44	.50	.46	.43	.49	.45	.43	.47	.44	.42	.46	.43	.41	.40	.165	3
				4	.46	.41	.38	.45	.41	.37	.44	.40	.37	.42	.39	.36	.41	.38	.36	.35	.157	4
				5	.41	.36	.33	.40	.36	.32	.39	.35	.32	.38	.35	.32	.37	.34	.31	.30	.148	5
				6	.37	.32	.28	.36	.32	.28	.35	.31	.28	.34	.31	.28	.34	.30	.28	.27	.139	6
				7	.33	.29	.25	.33	.28	.25	.32	.28	.25	.31	.27	.25	.30	.27	.24	.23	.130	7
				8	.30	.26	.22	.30	.25	.22	.29	.25	.22	.28	.25	.22	.28	.24	.22	.21	.122	8
				9	.28	.23	.20	.27	.23	.20	.27	.23	.20	.26	.22	.20	.25	.22	.19	.18	.115	9
				10	.25	.21	.18	.25	.21	.18	.25	.20	.18	.24	.20	.18	.23	.20	.18	.17	.108	10
45  Bilateral batwing distribution—4-lamp, 610 mm (2') wide fluorescent unit with flat prismatic lens and overlay—see note 7		V	N.A.	0	.57	.57	.57	.56	.56	.56	.53	.53	.53	.51	.51	.51	.49	.49	.49	.48		
				1	.50	.48	.46	.49	.47	.45	.47	.45	.44	.45	.43	.42	.43	.42	.41	.40	.204	1
				2	.43	.40	.37	.42	.39	.36	.40	.38	.35	.39	.37	.35	.37	.36	.34	.33	.192	2
				3	.37	.33	.30	.37	.33	.30	.35	.32	.29	.34	.31	.29	.33	.30	.28	.27	.175	3
				4	.33	.28	.25	.32	.28	.25	.31	.27	.24	.30	.27	.24	.29	.26	.24	.23	.159	4
				5	.29	.24	.21	.28	.24	.21	.27	.24	.21	.26	.23	.20	.25	.23	.20	.19	.145	5
				6	.26	.21	.18	.25	.21	.18	.24	.21	.18	.24	.20	.18	.23	.20	.17	.16	.132	6
				7	.23	.19	.16	.23	.18	.15	.22	.18	.15	.21	.18	.15	.21	.17	.15	.14	.122	7
				8	.21	.17	.14	.21	.16	.14	.20	.16	.13	.19	.16	.13	.19	.16	.13	.12	.112	8
				9	.19	.15	.12	.19	.15	.12	.18	.14	.12	.18	.14	.12	.17	.14	.12	.11	.104	9
				10	.17	.13	.11	.17	.13	.11	.17	.13	.11	.16	.13	.11	.16	.13	.10	.10	.096	10
46  Bilateral batwing distribution—one-lamp, surface mounted fluorescent with prismatic wraparound lens		V	N.A.	0	.87	.87	.87	.84	.84	.84	.77	.77	.77	.72	.72	.72	.66	.66	.66	.64		
				1	.75	.72	.69	.72	.69	.66	.67	.64	.62	.62	.60	.58	.57	.56	.54	.52	.296	1
				2	.65	.60	.56	.63	.58	.54	.58	.54	.51	.54	.51	.48	.50	.47	.45	.43	.261	2
				3	.57	.51	.46	.55	.49	.45	.51	.46	.42	.47	.43	.40	.44	.41	.38	.36	.232	3
				4	.50	.44	.39	.48	.42	.38	.45	.40	.36	.42	.38	.34	.39	.35	.32	.30	.209	4
				5	.45	.38	.33	.43	.37	.32	.40	.35	.31	.37	.33	.29	.35	.31	.28	.26	.189	5
				6	.40	.33	.28	.39	.32	.28	.36	.31	.26	.34	.29	.25	.31	.27	.24	.22	.172	6
				7	.36	.29	.25	.35	.29	.24	.32	.27	.23	.30	.26	.22	.28	.24	.21	.19	.158	7
				8	.33	.26	.22	.31	.25	.21	.29	.24	.20	.28	.23	.20	.26	.22	.19	.17	.146	8
				9	.30	.23	.19	.29	.23	.19	.27	.22	.18	.25	.21	.17	.24	.20	.17	.15	.135	9
				10	.27	.21	.17	.26	.21	.17	.25	.20	.16	.23	.19	.16	.22	.18	.15	.13	.126	10
47  Radial batwing distribution—4-lamp, 610 mm (2') wide fluorescent unit with flat prismatic lens—see note 7		V	1.7	0	.71	.71	.71	.69	.69	.69	.66	.66	.66	.63	.63	.63	.61	.61	.61	.60		
				1	.62	.59	.57	.60	.58	.56	.58	.56	.54	.55	.54	.52	.53	.52	.51	.50	.251	1
				2	.53	.49	.46	.52	.48	.45	.50	.47	.44	.48	.45	.43	.46	.44	.42	.41	.237	2
				3	.46	.41	.37	.45	.41	.37	.44	.40	.36	.42	.39	.36	.40	.38	.35	.34	.216	3
				4	.41	.35	.31	.40	.35	.31	.38	.34	.30	.37	.33	.30	.36	.32	.30	.28	.196	4
				5	.36	.30	.26	.35	.30	.26	.34	.29	.26	.33	.29	.26	.32	.28	.25	.24	.178	5
				6	.32	.27	.23	.32	.26	.23	.31	.26	.22	.29	.25	.22	.29	.25	.22	.21	.162	6
				7	.29	.24	.20	.28	.23	.20	.28	.23	.19	.27	.22	.19	.26	.22	.19	.18	.149	7
				8	.26	.21	.17	.26	.21	.17	.25	.20	.17	.24	.20	.17	.24	.20	.17	.16	.137	8
				9	.24	.19	.15	.24	.19	.15	.23	.18	.15	.22	.18	.15	.22	.18	.15	.14	.127	9
				10	.22	.17	.14	.22	.17	.14	.21	.17	.14	.20	.16	.14	.20	.16	.14	.12	.118	10
48  2-lamp fluorescent strip unit		I	1.6/1.2	0	1.01	1.01	1.01	.96	.96	.96	.87	.87	.87	.79	.79	.79	.72	.72	.72	.68		
				1	.84	.79	.75	.80	.76	.72	.72	.69	.66	.65	.63	.60	.59	.57	.55	.52	.414	1
				2	.72	.65	.59	.68	.62	.57	.62	.57	.52	.56	.52	.48	.50	.47	.44	.41	.343	2
				3	.62	.54	.48	.59	.52	.46	.53	.47	.42	.48	.43	.39	.43	.39	.36	.33	.293	3
				4	.54	.46	.39	.52	.44	.38	.47	.40	.35	.42	.37	.33	.38	.34	.30	.27	.255	4
				5	.48	.40	.33	.46	.38	.32	.41	.35	.30	.38	.32	.28	.34	.29	.26	.23	.225	5
				6	.43	.35	.29	.41	.33	.28	.37	.31	.26	.34	.28	.24	.30	.26	.22	.20	.202	6
				7	.38	.30	.25	.37	.29	.24	.34	.27	.22	.31	.25	.21	.28	.23	.19	.17	.182	7
				8	.35	.27	.22	.33	.26	.21	.31	.24	.20	.28	.22	.18	.25	.21	.17	.15	.166	8
				9	.32	.24	.19	.30	.24	.19	.28	.22	.18	.26	.20	.16	.23	.19	.15	.13	.152	9
				10	.29	.22	.17	.28	.21	.17	.26	.20	.16	.24	.18	.15	.22	.17	.14	.12	.140	10

STATEMENT OF IAN LEWIN

EXHIBIT G

Fig. 9-34. *Continued*

Typical Luminaire	Typical Intensity Distribution and Per Cent Lamp Lumens	ρ_{CC} →	80			70			50			30			10			0	WDRC	ρ_{CC} →
		ρ_W →	50	30	10	50	30	10	50	30	10	50	30	10	50	30	10	0		ρ_W →
	Maint. Cat. SC	RCR ↓	Coefficients of Utilization for 20 Per Cent Effective Floor Cavity Reflectance (ρ_{FC} = 20)																	RCR ↓
37	V 1.3	0	.52	.52	.52	.50	.50	.50	.46	.46	.46	.43	.43	.43	.39	.39	.39	.38		
		1	.44	.42	.40	.42	.40	.39	.39	.37	.36	.36	.35	.33	.33	.32	.31	.30	.201	1
		2	.38	.35	.32	.37	.33	.31	.34	.31	.29	.31	.29	.27	.28	.27	.25	.24	.171	2
		3	.33	.29	.26	.32	.28	.25	.29	.26	.24	.27	.25	.22	.25	.23	.21	.20	.149	3
		4	.29	.25	.22	.28	.24	.21	.26	.23	.20	.24	.21	.19	.22	.20	.18	.17	.132	4
		5	.26	.22	.19	.25	.21	.18	.23	.20	.17	.21	.18	.16	.20	.17	.15	.14	.117	5
		6	.23	.19	.16	.22	.18	.16	.21	.17	.15	.19	.16	.14	.18	.15	.13	.12	.106	6
		7	.21	.17	.14	.20	.16	.14	.19	.15	.13	.17	.15	.12	.16	.14	.12	.11	.096	7
		8	.19	.15	.12	.18	.15	.12	.17	.14	.12	.16	.13	.11	.15	.12	.11	.10	.088	8
		9	.17	.14	.11	.17	.13	.11	.16	.13	.10	.15	.12	.10	.14	.11	.09	.09	.081	9
2-lamp diffuse wraparound—see note 7		10	.16	.12	.10	.15	.12	.10	.14	.11	.09	.14	.11	.09	.13	.10	.09	.08	.075	10
38	IV 1.0	0	.60	.60	.60	.58	.58	.58	.56	.56	.56	.53	.53	.53	.51	.51	.51	.50		
		1	.53	.51	.49	.52	.50	.49	.50	.48	.47	.48	.47	.46	.46	.45	.44	.43	.168	1
		2	.47	.44	.42	.46	.43	.41	.44	.42	.40	.43	.41	.39	.41	.40	.38	.37	.159	2
		3	.42	.38	.36	.41	.38	.35	.40	.37	.35	.39	.36	.34	.37	.35	.34	.32	.146	3
		4	.38	.34	.31	.37	.34	.31	.36	.33	.30	.35	.32	.30	.34	.32	.30	.29	.135	4
		5	.34	.30	.27	.34	.30	.27	.33	.29	.27	.32	.29	.27	.31	.28	.26	.25	.124	5
		6	.31	.27	.24	.31	.27	.24	.30	.27	.24	.29	.26	.24	.28	.26	.24	.23	.114	6
		7	.29	.25	.22	.28	.24	.22	.28	.24	.22	.27	.24	.21	.26	.23	.21	.20	.106	7
		8	.26	.22	.20	.26	.22	.20	.25	.22	.20	.25	.22	.20	.24	.21	.19	.19	.099	8
4-lamp, 610 mm (2′) wide troffer with 45° plastic louver—see note 7		9	.24	.21	.18	.24	.21	.18	.24	.20	.18	.23	.20	.18	.23	.20	.18	.17	.092	9
		10	.23	.19	.17	.22	.19	.17	.22	.19	.16	.22	.19	.16	.21	.18	.16	.16	.086	10
39	IV 0.9	0	.55	.55	.55	.54	.54	.54	.51	.51	.51	.49	.49	.49	.47	.47	.47	.46		
		1	.49	.48	.46	.48	.47	.46	.46	.45	.44	.45	.44	.43	.43	.42	.42	.41	.137	1
		2	.44	.42	.40	.43	.41	.39	.42	.40	.38	.40	.39	.37	.39	.38	.37	.36	.131	2
		3	.40	.37	.34	.39	.36	.34	.38	.36	.33	.37	.35	.33	.36	.34	.32	.32	.122	3
		4	.36	.33	.30	.36	.33	.30	.35	.32	.30	.34	.31	.29	.33	.31	.29	.28	.113	4
		5	.33	.30	.27	.33	.29	.27	.32	.29	.27	.31	.28	.26	.30	.28	.26	.25	.104	5
		6	.30	.27	.24	.30	.27	.24	.29	.26	.24	.29	.26	.24	.28	.25	.24	.23	.097	6
		7	.28	.25	.22	.28	.24	.22	.27	.24	.22	.26	.24	.22	.26	.23	.22	.21	.090	7
		8	.26	.23	.20	.26	.22	.20	.25	.22	.20	.25	.22	.20	.24	.22	.20	.19	.085	8
4-lamp, 610 mm (2′) wide troffer with 45° white metal louver—see note 7		9	.24	.21	.19	.24	.21	.19	.23	.20	.18	.23	.20	.18	.23	.20	.18	.18	.079	9
		10	.23	.19	.17	.22	.19	.17	.22	.19	.17	.22	.19	.17	.21	.19	.17	.16	.075	10
40	V 1.2	0	.73	.73	.73	.71	.71	.71	.68	.68	.68	.65	.65	.65	.62	.62	.62	.60		
		1	.63	.60	.58	.62	.59	.57	.59	.57	.55	.56	.55	.53	.54	.53	.51	.50	.259	1
		2	.55	.51	.47	.54	.50	.46	.51	.48	.45	.49	.46	.44	.47	.45	.43	.42	.236	2
		3	.48	.43	.39	.47	.42	.39	.45	.41	.38	.43	.40	.37	.42	.39	.36	.35	.212	3
		4	.43	.37	.33	.42	.37	.33	.40	.36	.32	.39	.35	.32	.37	.34	.31	.30	.191	4
		5	.38	.33	.29	.37	.32	.28	.36	.31	.28	.35	.31	.28	.33	.30	.27	.26	.173	5
		6	.34	.29	.25	.34	.29	.25	.33	.28	.24	.31	.27	.24	.30	.27	.24	.23	.158	6
		7	.31	.26	.22	.31	.26	.22	.30	.25	.22	.29	.25	.21	.28	.24	.21	.20	.144	7
		8	.28	.23	.20	.28	.23	.20	.27	.23	.19	.26	.22	.19	.25	.22	.19	.18	.133	8
Fluorescent unit dropped diffuser, 4-lamp 610 mm (2′) wide—see note 7		9	.26	.21	.18	.26	.21	.18	.25	.21	.17	.24	.20	.17	.24	.20	.17	.16	.123	9
		10	.24	.19	.16	.24	.19	.16	.23	.19	.16	.22	.19	.16	.22	.18	.16	.15	.115	10
41	V 1.2	0	.69	.69	.69	.67	.67	.67	.64	.64	.64	.61	.61	.61	.59	.59	.59	.58		
		1	.60	.58	.55	.59	.57	.55	.56	.55	.53	.54	.53	.51	.52	.51	.50	.49	.227	1
		2	.52	.49	.45	.51	.48	.45	.49	.46	.44	.47	.45	.43	.46	.44	.42	.40	.214	2
		3	.46	.41	.38	.45	.41	.37	.43	.40	.37	.42	.39	.36	.40	.38	.35	.34	.196	3
		4	.41	.36	.32	.40	.35	.32	.39	.34	.31	.37	.34	.31	.36	.33	.30	.29	.178	4
		5	.36	.31	.28	.36	.31	.27	.35	.30	.27	.33	.30	.27	.32	.29	.26	.25	.162	5
		6	.33	.28	.24	.32	.27	.24	.31	.27	.24	.30	.26	.23	.29	.26	.23	.22	.148	6
		7	.30	.25	.21	.29	.25	.21	.28	.24	.21	.28	.24	.21	.27	.23	.21	.20	.136	7
		8	.27	.22	.19	.27	.22	.19	.26	.22	.19	.25	.21	.19	.25	.21	.19	.17	.126	8
Fluorescent unit with flat bottom diffuser, 4-lamp 610 mm (2′) wide—see note 7		9	.25	.20	.17	.25	.20	.17	.24	.20	.17	.23	.20	.17	.23	.19	.17	.16	.116	9
		10	.23	.18	.15	.23	.18	.15	.22	.18	.15	.22	.18	.15	.21	.18	.15	.14	.108	10
42	V 1.4/1.2	0	.75	.75	.75	.73	.73	.73	.70	.70	.70	.67	.67	.67	.64	.64	.64	.63		
		1	.67	.64	.62	.65	.63	.61	.63	.61	.59	.60	.59	.58	.58	.57	.56	.55	.208	1
		2	.59	.56	.52	.58	.55	.52	.56	.53	.51	.54	.52	.49	.52	.50	.48	.47	.199	2
		3	.53	.48	.45	.52	.48	.44	.50	.46	.43	.48	.45	.43	.47	.44	.42	.41	.186	3
		4	.47	.42	.38	.46	.42	.38	.45	.41	.38	.44	.40	.37	.42	.39	.37	.35	.172	4
		5	.43	.37	.34	.42	.37	.33	.41	.36	.33	.39	.36	.33	.38	.35	.32	.31	.160	5
		6	.39	.33	.30	.38	.33	.29	.37	.32	.29	.36	.32	.29	.35	.31	.29	.27	.148	6
		7	.35	.30	.26	.35	.30	.26	.34	.29	.26	.33	.29	.26	.32	.28	.26	.24	.138	7
		8	.32	.27	.24	.32	.27	.23	.31	.26	.23	.30	.26	.23	.29	.26	.23	.22	.128	8
Fluorescent unit with flat prismatic lens, 4-lamp 610 mm (2′) wide—see note 7		9	.30	.25	.21	.29	.24	.21	.28	.24	.21	.28	.24	.21	.27	.24	.21	.20	.120	9
		10	.27	.22	.19	.27	.22	.19	.26	.22	.19	.26	.22	.19	.25	.22	.19	.18	.113	10

STATEMENT OF IAN LEWIN

EXHIBIT H

constructed that the housing forms the reflecting surface. The assembly is enclosed by a cover glass.

germicidal effectiveness† See *bactericidal (germicidal) effectiveness.*

germicidal efficiency of radiant flux† See *bactericidal (germicidal) efficiency of radiant flux.*

germicidal exposure† See *bactericidal (germicidal) exposure.*

germicidal flux and flux density† See *bactericidal (germicidal) flux* and *bactericidal (germicidal) flux density.*

germicidal lamp a low-pressure mercury lamp in which the envelope has high transmittance for 254-nm radiation. See *bactericidal lamp.*

glare the sensation produced by luminances within the visual field that are sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility. See *blinding glare, direct glare, disability glare,* and *discomfort glare.*

Note The magnitude of the sensation of glare depends on such factors as the size, position, and luminance of a source; the number of sources; and the luminance to which the eyes are adapted.

globe a transparent or diffusing enclosure intended to protect a lamp, to diffuse and redirect its light, or to change the color of the light.

glossometer an instrument for measuring gloss as a function of the directionally selective reflecting properties of a material in angles near to and including the direction giving specular reflection.

glow discharge an electric discharge characterized by a low, approximately constant current density at the cathode (on the order of 10 $\mu A/mm^2$) at low cathode temperature and a high voltage drop (typically 50 V or more). Secondary emission from the cathode is much greater than the thermionic emission.

Note A distinction is made between the normal cathode drop (potential difference due to space charge near the cathode) that occurs when the glow does not cover the cathode completely (with constant current density) and that is independent of the discharge current, and the abnormal cathode drop that occurs when the glow covers the cathode completely (with increased current density) and that depends on the discharge current.

glow factor a measure of the visible light response of a fluorescent material to black light. It is equal to π times the luminance in cd/m^2 produced on the material divided by the incident black-light flux density in mW/m^2. It can be measured in lm/mW.

glow lamp an electric-discharge lamp whose mode of operation is that of a glow discharge and in which light is generated in the space close to the electrodes.

goniophotometer a photometer for measuring the directional light distribution characteristics of sources, luminaires, media, and surfaces.

graybody a temperature radiator whose spectral emissivity is less than unity and the same at all wavelengths.

ground-area open floodlight (O) a unit providing a weatherproof enclosure for the lamp socket and housing. No cover glass is required.

ground-area open floodlight with reflector insert (OI) a weatherproof unit so constructed that the housing forms only part of the reflecting surface. An auxiliary reflector is used to modify the distribution of light. No cover glass is required.

ground light visible radiation from the sun and sky reflected by surfaces below the plane of the horizon.

group flashing light a flashing light in which the flashes are combined in groups, each including the same number of flashes, and in which the groups are repeated at regular intervals. The duration of each flash is clearly less than the duration of the dark periods between flashes, and the duration of the dark periods between flashes is clearly less than the duration of the dark periods between groups.

H

hard light light that causes an object to cast a sharply defined shadow.

hazard or obstruction beacon an aeronautical beacon used to designate a danger to air navigation.

hazardous location an area where ignitable vapors or dust can cause a fire or explosion created by energy emitted from lighting or other electrical equipment or by electrostatic generation.

headlamp a major lighting device mounted on a vehicle and used to provide illumination ahead of it. Also called a *headlight.* See *multiple-beam headlamp* and *sealed-beam headlamp.*

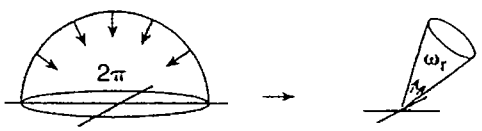
headlight† an alternative term for headlamp.

heat extraction thermal factor the fractional lumen loss or gain due to passage of room air being returned to the plenum through the lamp compartment of the luminaire.

heavy-duty floodlight (HD) a weatherproof unit having a substantially constructed metal housing into which is placed a separate and removable reflector. A weatherproof hinged door with cover glass encloses the assembly but provides an unobstructed light opening at least equal to the effective diameter of the reflector.

hemispherical-conical reflectance, $\rho(2\pi; \omega_r)$ the ratio of reflected flux collected over a conical solid angle to the incident flux from the entire hemisphere.

Note The direction and extent of the cone must be specified.



DEFENDANT'S MARKMAN STATEMENT

EXHIBIT 3

Webster's Third New International Dictionary

OF THE ENGLISH LANGUAGE

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at FIRE] : MIZZONITE; *specif* : a variety of scapc ^h the components marialite and meionite in a ratio of a . 3:2
dir *abbr* 1 direction; directional 2 director
di-radical \(')dī+\ *n -s* [*di-* + *radical*] : BIRADICAL
dir-ca \'darkə\ *n* [NL, fr. L *Dirce*, a fountain near Thebes in Boeotia, fr. Gk *Dirkē*] 1 *cap* : a genus of shrubs (family Thymelaeaceae) having tough fibrous bark and clusters of yellow flowers — *see* LEATHERWOOD 1a 2 *-s* : any plant of the genus *Dirca*
¹dird \'dird\ *n -s* [prob. short for *dirdum*] *Scot* : a powerful blow or stroke
²dird \"\ *vb, Scot* : BUMP, BOUNCE, JOLT
dir-dum \'dirdəm\ *n -s* [ME (northern dial.) *durdan*, fr. ScGael, grumbling, hum, dim. of *durd* hum, word, sound; akin to IrGael *dordan* hum, buzz, *dord* humming, buzzing] 1 *Scot* : UPROAR, FUSS 2 *Scot* a : REBUKE, SCOLDING b : BLAME, PUNISHMENT 3 *Scot* : a piece of bad luck : MISFORTUNE
dire \'dī(ə)r, -īə\ *adj* -ER/-EST [L *dirus;* akin to Gk *dedienai* to fear, *deos* fear, *deinos* terrible, Av *dvaēthā* threat, Skt *dveṣṭi* he hates] 1 a : exciting horror or terror esp. because of the great suffering or loss or devastating ruin actually caused or only threatened ⟨the ~ days of bombing raids⟩ ⟨if South America were to seek her imports elsewhere, it would be a ~ blow to us —Gustave Weigel⟩ ⟨the ~ fate which the Lord had seen fit to visit upon her sinful employers —W.H.Wright⟩ b : inducing mental suffering or depression by reason of concern with a dreaded eventuality or a grievous circumstance : AFFLICTIVE, PAINFUL ⟨palsied by the ~ news of the president's death⟩ c : oppressive to the feelings or spirit : DISMAL, CHEERLESS ⟨the heavy drag of winter is then at its most ~ —F.M.Ford⟩ ⟨despite its ~ point of view, the book jests and jostles with life —*Time*⟩ 2 : warning of disaster to come : OMINOUS, SINISTER ⟨in the fight against foot-and-mouth disease proposals to substitute vaccination for eradication evoked ~ forecasts⟩ 3 a : demanding immediate action to fend off disastrous consequences : EXIGENT, URGENT ⟨spokesmen talked about the ~ need for school buildings, which had been at least equally ~ during the previous two years —W.L.Miller⟩ ⟨this was due to ~ necessities elsewhere and not to direct intent or indifference —Herbert Feis⟩ b : close to the utmost limit of sufferance : most acute : EXTREME, DESPERATE ⟨scope is left for instantaneous action, but only in the *direst* emergency —A.P.Ryan⟩ ⟨while their means were always modest there was no trace of ~ poverty —J.T.Ellis⟩ ⟨left his family in ~ financial straits⟩
syn see FEARFUL
¹di-rect \də'rekt *also* dī'r- *sometimes* 'dī,r- — *compare* ²DIRECT\ *vb* -ED/-ING/-S [ME *directen*, fr. L *directus*, past part. of *dirigere* to set straight, direct, guide — more at DRESS] *vt* 1 a *obs* : to dedicate to a person b *obs* : to write to a person c : to mark or label the outer surface of ⟨a message or package to be delivered⟩ with the name and residence or place of business of the intended recipient : SUPERSCRIBE d : to supply with a heading, statement, or other indication of a specific addressee or desired recipient ⟨the auditors' certificate ~*ed* to the stockholders⟩ e : to impart orally ⟨the speaker ~*ed* a side remark to the gallery⟩ f : to adapt and arrange in expression so as to have particular applicability or appeal : ANGLE — used with *to* or *at* ⟨a lawyer who ~*s* his appeals to intelligence and character⟩ 2 : to cause to turn, move, or point undeviatingly or to follow a straight course with a particular destination or object in view: a : to dispatch, aim, or guide usu. along a fixed path ⟨X rays are ~*ed* through a portion of the body⟩ ⟨wavelengths ~*ed* to southeast Asia⟩ ⟨sensitivity to humor ~*ed* toward himself⟩ ⟨to Peru was ~*ed* one of the main currents of Spanish colonial conquest —P.E.James⟩ ⟨that Locke's influence upon his successors was primarily to ~ them to empiricism —J.W.Yolton⟩; *also* : ASSIGN, ALLOT ⟨many industries ~ part of their earnings to academic scholarship funds⟩ b : to devote with concentration — used usu. with *to* or *toward* ⟨has he found that he must have someone else toward whom he can ~ his mind and in whom he can expand himself —H.A.Overstreet⟩ ⟨~*ing* their whole attention toward the international conflict⟩ c : to aim fixedly : concern or involve oneself primarily or totally with — used with *to* or *toward* ⟨ecclesiastical policy was ~*ed* primarily toward the liberation of the church from the fetters of secular interest and state expediency —H.D.Hazeltine⟩ ⟨applied research may be defined as research ~*ed* to the end of reducing the degree of empiricism in a practical art —J.B.Conant⟩ d : to point, extend, or project esp. upward or downward ⟨in these mammoths the tusks are vertically ~*ed* at their bases —A.S.Romer⟩ e : to engage in or launch hostilely : FOCUS — used with *against* or *at* ⟨our policy is not ~*ed* against any country or doctrine but against hunger, poverty, desperation, and chaos —G.C.Marshall⟩ ⟨if atomic or biological warfare should be ~*ed* against us⟩; *also* : to institute for possible launching or application ⟨binding agreements of a much more specific character ~*ed* at a potential aggressor —Vera M. Dean⟩ 3 : to show or point out the way for ⟨a guide ~*s* tourists to the marine museum⟩ ⟨the map ~*s* us to the left⟩ 4 : to regulate the activities or course of: a : to guide and supervise ⟨~*ed* the floor strategy in the House of Representatives⟩ ⟨the archaeologist ~*ing* the excavations⟩; *specif* : to carry out the organizing, energizing, and supervising of esp. in an authoritative capacity ⟨~*ed* the building and arming of an underground network⟩ ⟨not only public propaganda, but also cultural infiltration, is ~*ed* from the same source —A.T.Bouscaren⟩ b : ADMINISTER, CONDUCT ⟨ably ~*ed* music and language departments⟩ ⟨while in office he ~*ed* vigorous prosecutions of racketeers⟩ c : to dominate and determine the course of ⟨will not find it preposterous that the past should be altered by the present as much as the present is ~*ed* by the past —T.S.Eliot⟩ d : to assist by giving advice, instruction, and supervision ⟨the major professor ~*s* graduate students' thesis research⟩; *specif* : to lend a refining, cultivating, or inspiring influence to ⟨~ American taste and mold the genius of the young republic —Van Wyck Brooks⟩ e : to train and lead performances of (a musical or dramatic aggregation); *also* : to lead a group in presenting (a ballet, opera, concert, play, or motion picture) 5 a : to request or enjoin esp. with authority ⟨the judge ~*ed* the clerk to pass him the paper⟩ ⟨the resolution ~*ed* the commission to prepare proposals⟩ ⟨I ~ my executors to present my library intact to my alma mater⟩; *also* : to issue an order to ⟨Lee ~*ed* Jackson to make a wide march to the southwest —T.R.Hay⟩ b : to prescribe esp. by formal or mandatory instruction or legal enactment ⟨a court order ~*ing* that the person be brought to a court hearing⟩ ⟨postal inspectors ~*ed* destruction of the obscene matter⟩ ~ *vi* 1 : to point out, prescribe, or determine a course or procedure ⟨however chance shall ~⟩ ⟨the ~*ing* agencies of society — the family, the city, the church, the school, the workshop, and above all the state —J.M.Cameron⟩ ⟨the old theological notion that there is in the universe besides ourselves some ~*ing* power that means well by us —J.W.Beach⟩ 2 : to direct an orchestra or chorus or a dramatic group or performance ⟨equally clever at composing and ~*ing*⟩
syn ADDRESS, DEVOTE, APPLY: these four verbs have in common a reflexive use signifying to turn or bend one's attention, energies, or efforts to something. DIRECT and ADDRESS are not significantly different; one can *direct* or *address* oneself to a task, to one's work, or to the study of something; one can *direct* or *address* one's attention, one's remarks, one's writings to something or someone. DIRECT may possibly stress more an aim or intent, ADDRESS more an appeal to or claim upon attention or interest ⟨asked myself to what purpose I should *direct* my energies —M.R.Cohen⟩ ⟨to *direct* my endeavors . . . toward the object of my search —Mary W. Shelley⟩ ⟨speakers *addressed* themselves to a common question —H.W.Sams⟩ ⟨a story *addressed* not only to one's sense of excitement and the exotic but also to his sense of honor and humanity —Charles Lee⟩ DEVOTE often adds the implication of persistence or of personal dedication ⟨at Cornell he *devoted* himself primarily to his studies and to athletics —*Current Biog.*⟩ ⟨*devoted* himself chiefly to the affairs of this school for the next eight or ten years of his life —S.P.Chase & R.E.Ham⟩ APPLY stresses often an intentional turning of the attention or energies, often a concentration or concentrated application; one APPLIES oneself to a task when, after consideration, he determines upon doing the task, or when he directs his whole attention to it, esp. for some time ⟨he cannot *apply* himself to study —Charles Clairmont⟩ ⟨after having received a careful education . . . he *applied* his attention to practical military subjects —*Encyc. Americana*⟩ **syn** see in addition COMMAND, CONDUCT
²di-rect \də'rekt *also* (')dī,r-, *rapid* 'dre-; *after a monosyllabic prefix -dī- occurs less often than in other environments, pronunciations like* dī,rekt ə'nində,rekt (*"direct and indirect"*) *being frequent*\ *adj sometimes* -ER/-EST [ME, fr. L *directus* straight, direct, fr. past part. of *dirigere*] 1 a : proceeding from one point to another in time or space without deviation or interruption : not crooked, oblique, reflected, refracted, or circuitous ⟨~ blows of the gavel⟩ ⟨disintegrated by the ~ heat⟩ ⟨exposed to the ~ force of the hurricane⟩ b : leading by the short or shortest way to a point or end ⟨a ~ route⟩ ⟨~ means⟩ ⟨~ rays⟩ ⟨~ and speedy passenger service to the coast⟩ c *obs* : moving or extending at a right angle to a surface ⟨a ship needs a ~ wind to enter⟩ d : transmitted back and forth without an intermediary ⟨engaged in a ~ exchange of recriminations⟩ ⟨no ~ communication with the flooded area⟩ e : assigned in the postal service for separate delivery to a particular addressee rather than routed according to street address ⟨a letter deposited in a ~ pouch⟩ f : capable of being allocated to a particular portion or process of an undertaking and so treated in cost accounts; *specif* : chargeable to a particular job — compare DIRECT COST, DIRECT LABOR 2 a : operating or guided without digression or obstruction ⟨while he gives his more ~ attention to something nearer at hand —Nathaniel Hawthorne⟩ ⟨her letters . . . are a ~ reflection of her personality —R.A.Hall b. 1911⟩ ⟨~ expansion of consumption is of utmost urgency —*New Republic*⟩ b : stemming immediately from a source ⟨having no ~ authority over factory employment policies⟩ c : being or passing in a straight line of descent from parent to offspring : LINEAL ⟨only a collateral relative, not his ~ ancestor⟩ ⟨the examiner should not overvalue the influence of ~ heredity —H.G.Armstrong⟩ d : clear-cut and distinctive : having no compromising or impairing element : GENUINE, OUT-AND-OUT ⟨an undertaking having a ~ social purpose⟩ ⟨the soldier's pleasures are simple and ~ —Fred Majdalany⟩ ⟨hoping to avoid ~ involvement in the war⟩ e : blunt and unqualified : delivered point-blank : CATEGORICAL ⟨his petition for a salary increase was met with a ~ rebuff⟩ ⟨get back to your post. That's a ~ order —Irwin Shaw⟩ ⟨evidence from original documents of the dark ages often give the lie ~ to sentimental novelists⟩ f *cryptanalysis, of alphabetic sequences* : arranged or employed in traditional order : not reversed 3 a : characterized by or giving evidence of a close esp. logical, causal, or consequential relationship ⟨there is a ~ personal tie which assures the beginning of real understanding between individuals —D.J.Shank⟩ ⟨most scientific discoveries now have a ~ bearing on security⟩ ⟨for 20 years in ~ association with the library⟩ ⟨a hundred different complications in which we shall have a ~ interest —F.D. Roosevelt⟩ b : INEVITABLE, UNEQUIVOCAL ⟨one ~ result of improving the living conditions was a rise in the birthrate⟩ c : serving to get to the point : EFFECTIVE ⟨raising funds would be a ~ way of helping the cause⟩ d : communicating explicitly often with brusqueness : going straight to the point ⟨before any inquiry so ~ as to demand a positive answer was addressed to her —Jane Austen⟩ ⟨keeps the play ~, uncluttered, and so brisk that the long and familiar story does not make martyrs of its audience —Henry Hewes⟩ ⟨her choreography is ~, nowhere obscured by extraneous devices⟩ e : frank, natural, and positive : STRAIGHTFORWARD ⟨a charming, lively person who had a ~ mind, said what he thought and believed others did the same —*Times Lit. Supp.*⟩ ⟨that one's relations with others should be ~ and not diplomatic —A.C.Benson⟩ ⟨it often told you a great deal that was both too ~ and too elusive for words —Willa Cather⟩ f *of the object of a verb* : being the one that is the primary goal of an action ⟨*him* in "I saw him" and *me* in "he hit me" are ~ objects⟩ or that results from an action ⟨*a house* in "we built a house" is the ~ object⟩ 4 : marked by absence of an intervening agency, instrumentality, or influence : IMMEDIATE: a : made, carried on, or effected without any intruding factor or intervening step ⟨~ loans⟩ ⟨relying less and less on ~ observation of nature —Eric Newton⟩ ⟨some ~ borrowing of Anglo-Norman into English⟩ ⟨until the breaking off of ~ negotiations⟩ b : effected by the votes of the people or the electorate and not by representatives ⟨elected for 7 years by ~ suffrage —*Statesman's Yr. Bk.*⟩ ⟨institutions of ~ democracy — popular initiative, the referendum, and the recall —C.A.M.Ewing⟩ ⟨the ~ election of senators —E.P.Herring⟩ c : unhampered by divergent, intervening, or separative forces ⟨he had more ~ access to the governor than the legislators⟩ ⟨prefer the more ~ American approach to human problems —David Daiches⟩ d : effected by one object or substance in contact with another with no insulating or obstructing element between ⟨~ contact with another metal must be avoided⟩ ⟨there is no ~ connection between the apartments⟩ e : consisting of or reproducing the exact words of a real or supposed original speaker ⟨the words in quotation marks in the sentence *He said, "I can come"* are ~ quotation⟩ ⟨~ discourse⟩ f (1) : being without intermediate logical steps ⟨~ proofs⟩ (2) : independent of intermediate representations, percepts, images, or sense data ⟨~ knowledge of things⟩ g : not requiring an intermediate host for completion : MONOXENOUS — used of the life cycle or development of a parasitic organism h : capable of dyeing without the aid of a mordant : SUBSTANTIVE — see DIRECT DYE 5 a : experienced personally without associative effort of anyone else ⟨his account of the battle contains much ~ evidence⟩ ⟨whereas to conceal ~ pain was a virtue, to conceal vicarious pain was a sin —Jan Struther⟩; *specif* : FIRSTHAND ⟨from ~ experience with youngsters at camp⟩ b : active, personal, and responsible ⟨taking ~ charge of the distribution of relief funds⟩ ⟨the ordinary worker has a ~ part in the production process⟩; *specif* : not deputed or to be deputed ⟨few were willing to assume ~ responsibility⟩ 6 a *of a celestial body* : moving in the general planetary direction from west to east : not retrograde b *of a binary star* : following the direction of increasing position angle : COUNTER-CLOCKWISE 7 *of a sundial* : having a vertical face and facing squarely toward one of the cardinal points of the compass
³di-rect \də'rekt *also* dī'r-, *rapid* 'dre-\ *adv* [ME, fr. *direct*, adj.] : in a direct way: a : from point to point without deviation : by the short or shortest way ⟨by helicopter it is now possible to go ~ from port to airport in forty minutes —Ivor Jones⟩ ⟨despatching individual books ~ to individual teachers —James Britton⟩ b : from the source or the original without interruption or diversion ⟨broadcast ~ from ringside⟩ ⟨the writer must take his material ~ from life —Douglas Stewart⟩ c : mechanically joined or in mesh : mechanically or electrically in contact (*direct*-controlled by the helmsman) d (1) : without any intervening agency or step : without any intruding or diverting factor ⟨some enter a career ~ from college⟩ ⟨refusal to negotiate ~ with the puppet regime⟩; *specif* : without use of a broker or other middleman ⟨butter that is sold ~ without going through the exchanges —Geoffrey Shepherd⟩ (2) : EXPLICITLY, UNEQUIVOCALLY ⟨the right information ~ from his office⟩ ⟨in reporting news the television camera brings the event and the personalities ~ to the public —*Collier's Yr. Bk.*⟩ (3) : VERBATIM ⟨translated ~ from the Russian text⟩
⁴direct \"\ *n -s* [*¹direct*] 1 : a character sometimes put at the end of a musical staff or page of music on a line or space corresponding to the position of the first note of the next staff as a warning to the performer — called also *custos* 2 : a direct package of postal matter
di-rect-able \də'rektəbəl *also* dī'r-, *rapid* 'dre-\ *adj* : capable of being directed
direct-acting \ˌ=ˈ=ˌ=, ˌ=ˈ=ˌ=\ *adj* : involving direct action without the intervention of other working parts ⟨*direct-acting* engine⟩ ⟨*direct-acting* pump⟩
direct action *n* : action that seeks to achieve an end directly and by the most immediately effective means as opposed to the use of diplomatic exchange or negotiation; *specif* : action by organized labor to obtain ends by means of boycott, sabotage, or striking — contrasted with *political action*
direct bearing *n* : direct vertical support for any structural element in a construction
direct black *n* : any of various direct dyes that dye cotton black — see DYE table I
direct cell division *n* : AMITOSIS
direct cerebellar tract *n* : a tract of fibers in the posterior part of the spinal cord that is external to the crossed pyramidal tract, that arises from the cells of the nucleus dorsalis, and that passes through the restiform body of the medulla to the cerebellum
direct-connected \ˌ=ˈ=ˌ=, ˌ=ˈ=ˌ=\ *adj, of machines* : being on a common shaft : DIRECT-COUPLED
direct contempt *n* : a contempt occurring in the presence of a court in session or so near as to interfere with the administration of justice or in the presence of a judge acting in a judicial capacity; *also* : a contempt directly obstructing a legislative body in the actual exercise of its lawful legislative powers — compare CONSTRUCTIVE CONTEMPT
direct control *n* : a control that is directly imposed upon the manufacturing, pricing, and distribution of specific goods in contrast with an indirect or general control (as a credit and fiscal policy) that affects the economy in its entirety and specific goods only indirectly
direct cost *also* **direct charge** *n* : a cost that may be computed and identified directly with a product, function, or activity and that usu. involves expenditures for raw materials and direct labor and sometimes specific and identifiable items of overhead — contrasted with *indirect cost*
direct-coupled \ˌ=ˈ=ˌ=, ˌ=ˈ=ˌ=\ *adj* 1 *of belting or gearing* : coupled without intermediate connections 2 *of an electric circuit* : having conductive rather than inductive or capacitive coupling
direct current *n* : an electric current flowing in one direction only and substantially constant in value — abbr. *D.C.;* compare ALTERNATING CURRENT
direct deep black EW *n, usu cap both Ds&B* : a trisazo dye derived from benzidine and used esp. for dyeing cotton and leather and as a biological stain — called also *chlorazol black E, direct black EW;* see DYE table I (*under Direct Black 38*)
direct democracy *n* : DEMOCRACY 1b(1)
direct development *n* : development without a metamorphosis
direct distance dialing *n* : the dialing of a telephone number outside the local calling area by using initial code numbers to make a direct connection — abbr. *DDD*
direct drive *n* : a drive whose driving and driven parts are direct-connected
direct-driven \ˌ=ˈ=ˌ=, ˌ=ˈ=ˌ=\ *adj* : driven by another machine to which it is direct-connected
direct dye *n* : a water-soluble dye usu. of the azo class that is used in alkaline or neutral solution esp. for dyeing cellulosic material (as cotton or paper) directly — see DYE table I
directed *adj* [fr. past part. of *¹direct*] 1 : having a positive or negative sense — used of a line segment or vector 2 : subject to regulation by a guiding and supervising agency ⟨a ~ economy that would permit an increased volume of capital investments on the part of the state —C.A.L.Rich⟩ ⟨a ~ study program for gifted children⟩
di-rect-ed-ly *adv* : under guidance and supervision
di-rect-ed-ness *n -ES* : subjection to a guiding or motivating influence ⟨the interplay within the individual of these two —*es* —Adam Curle⟩
directed number *n* : a number preceded by a plus or minus sign
directed verdict *n* : a verdict that the jury is instructed by the court to find when the facts proved do not admit in the court's opinion of any reasonable doubt
di-rect-ee \də,rek'tē, dī,r-, ,dī,rek'-\ *n -s* [*¹direct* + *-ee*] : one who receives direction
directer *comparative of* DIRECT
directest *superlative of* DIRECT
direct evidence *n* : evidence that if true immediately establishes the fact to be proved by it
direct examination *n* : the first examination of a witness in the orderly course by the party calling him and upon the merits
direct exchange *n* : FIXED EXCHANGE
direct finder *n* : DIRECT VIEWFINDER
direct fire *n* (fr. *¹direct* + *fire, v.*] : gunfire by direct aiming on a visible target
direct-fire \ˌ=ˈ=, ˌ=ˈ=\ *vt* : to fire without provision for preheating the air or gas ⟨some furnaces are *direct-fired*⟩
direct-geared \"\ *adj* : connected for power transmission by a gear on the power shaft of one machine meshing with a gear on the driving or following shaft of another machine
direct grant school *n, in England & Wales* : a private secondary school that receives a direct grant from the ministry of education and in return binds itself to obey certain conditions with reference to admission of pupils
directing *pres part of* DIRECT
directing piece *n* : BASE PIECE
direct initiative *n* : the legislative initiative where a proposed measure is submitted directly to the voters — distinguished from *indirect initiative;* compare INITIATIVE 3b
direct investment *n* : investment of capital in physical assets or in ownership of a whole enterprise — contrasted with *portfolio investment*
¹di-rec-tion \də'rekshən *also* dī'r-, *rapid* 'dre-\ *n -s* [MF & L; MF, fr. L *direction-, directio*, fr. *directus* (past part. of *dirigere* to direct, guide) + *-ion-, -io* -ion — more at DRESS] 1 a : guidance or supervision of action, conduct, or operation ⟨the whole system of life had its culmination in the church; and parson and squire presided over its ~ —C.E.Raven⟩ ⟨under whose ~ this paper was written⟩ ⟨the doctrine that government should move forward toward ~ of the economy⟩; *specif* : chief executive function ⟨he was put in charge and given overall ~ of the program⟩ b : the art and technique of directing a stage play, a motion picture, or a television program consisting of the selection of the effects to be produced, the means to produce these effects, and the management and training of the cast c : the art and technique of directing the performance of an orchestra, opera, or concert or of a chorus or other musical group ⟨the musicianly ~ . . . helped illumine the score —Miles Kastendieck⟩ d : a word or phrase usu. in Italian or a sign indicating the appropriate tempo, mood, or intensity of a passage or movement in a musical score 2 *archaic* : the address placed on the outside of a letter or package to be delivered : SUPERSCRIPTION ⟨pray send me Grandmamma's ~. I must write to her —W.M.Thackeray⟩ 3 a : something that is imposed as authoritative instruction or bidding ⟨the senate had been voting according to ~ for so long that they seemed to have lost the power of independent decision —Robert Graves⟩ ⟨he gave orders all round and men quickly obeyed— relieved at ~ —Harris Downey⟩ b : an explicit instruction ; ORDER, COMMAND ⟨a report prepared at the ~ of the president⟩ — often used in pl. ⟨the author's stage ~*s* to actors and cameramen⟩ ⟨~*s* appear on the package⟩ c : the charge or instruction given on a point of law by a judge to a jury 4 *obs* : administrative capacity 5 a : the property of space by which given two positions others may be generated or determined in the same dimension and relation, the aspect of progression being usu. implicit b : the line or course on which something is moving or is aimed to move or along which something is pointing or facing ⟨the ~ of a current is that toward which the water moves, which is the reverse of the way winds are named —G.W.Mixter⟩ ⟨follow the ~ of the arrow⟩ c : a line or course extending away from a given point through space and often designated by the point of the compass toward which it extends ⟨from the tower sweeping views in all ~*s*⟩ ⟨below the falls the river meanders in a southeasterly ~⟩ d : the shortest path toward the vicinity or source — used in the expression *in the direction of* ⟨throwing grenades in the ~ of the voices⟩ e : a position on a line extending through space toward a point of the compass ⟨from what ~ will the attack come⟩ ⟨protests poured in from all ~*s*⟩; *also* : a point of view or an angle from which something may be considered ⟨the three authors attack the same subject from three different ~*s*⟩ f : the angle between a true north-south line passing through the position of the observer and a great circle passing through both this position and a given point on the surface of the earth : BEARING g : the path of either the longest straight line that can be drawn along a sheet or band of paper or a straight line crossing this at right angles from edge to edge 6 a : a channel or direct course of thought or action ⟨the outbreak of war gave another ~ to his activities⟩ ⟨the ~*s* in which voters can express their will are limited⟩ ⟨with business expanding in all ~*s*⟩ b : a course of progress, development, or evolution showing a distinct tendency or trend ⟨his latest

beard on the human face ⟨a slender lad w... ...st a trace of ~ on his cheeks⟩; *also* : fine soft hair elsewhere on the body ⟨tanned arms lightly covered with a silvery ~⟩ **b** : the pubescence of a plant ⟨wipe the ~ off the peaches⟩; *also* : a soft tuft (as a coma or pappus) on some plant part **c** : soft fur fiber usu. from the undercoat of an animal **d** : a fine powdery coating or surface ⟨a ~ of crystals⟩ — **in the down** *of a young bird* : covered with down

[4]down \"\ *vt* -ED/-ING/-S : to cover, ornament, line, or stuff with down : make downy ⟨a mouse ~*ed* in its winter coat —Herbert Gold⟩

[5]down \"\ *adj, usu cap* [fr. *Down*, county of Northern Ireland] : of or from County Down, Northern Ireland : of the kind or style prevalent in County Down

dow-na \'dau̇nə\ [*idow* + *na*] *chiefly Scot* : CANNOT

down-along \ˌ=ə'=\ *adv, dial* : down the length of something (as a coast or road) : to or at a point in the distance

[1]down-and-out \ˌ=ə'=\ *adj* [*down* + *and* + *out*, adj.] **1** : so weakened, disabled, or incapacitated as to be ineffective : broken in health **2** : suffering irrecoverably from financial losses or deficiencies **3** *of a boxer* : so broken down by past beatings as to be incompetent as a pugilist

[2]down-and-out \"\ *n* -S [*down-and-out*] **1** *also* **down-and-out-er** \-ə(r)\ [*down-and-outer* fr. *down-and-out* + *-er*] : a person who is down-and-out **2** : the play or discard in bridge of a high card of a nontrump suit followed by a lower card of the same suit to indicate ability to trump if a third round of the suit is led

down-at-heel \ˌ=ə'=\ *or* **down-at-the-heel** \ˌ=ə=ə'=\ *also* **down-at-heels** \ˌ=ə'=\ *or* **down-at-the-heels** \ˌ=ə=ə'=\ *adj* : marked by a slovenly slipshod condition or having a threadbare faded appearance : SHABBY ⟨loneliness gnawed at the lives of all the guests in . . . a *down-at-the-heel* private hotel in an English seaside town —Pamela Taylor⟩ ⟨occurred to him that he was *down-at-heel*, dingy —Martha Gellhorn⟩ ⟨should have to pass the hat round or try (dressed like a *down-at-heels* corner boy) to get some sort of job —Nicholas Monsarrat⟩

downbear \(ˌ)='=\ *vt* [ME *dounberen*, fr. *doun* down + *beren* to bear, carry — more at DOWN, BEAR] *archaic* : to bear down : DEPRESS : press upon

[1]downbeat \'=ˌ=\ *n* **1** : the downstroke of the conductor indicating the first stressed beat of a musical composition; *also* : any first beat : THESIS **2** : an ictus or arsis : STRESS **3** : a decline in activity or prosperity : depressed condition

[2]downbeat \"\ *adj* : PESSIMISTIC, GLOOMY, UNHAPPY ⟨a movie with a ~ ending⟩

down-beater \'=ˌ=ə=\ *n* [*down* + *beater*] : a rotating device used on a combine to beat down the moving grain and help to feed it uniformly to the cylinder

downbend \'=ˌ=\ *n* : a depression (as in the bed of the sea) due to downward bending of the earth's crust

downbent \'=ˌ=\ *adj* : bowed or drawn downward ⟨~ trees marked the path of the storm⟩ ⟨a tired ~ old man⟩

downbound \'=ˌ=\ *adj* : heading or leading in any direction that is conventionally down ⟨a ~ channel⟩ ⟨~ traffic⟩

down-bow \'=ˌbō\ *n* : a stroke in playing a bowed instrument (as a violin) from the heel toward the point of the bow — contrasted with *up-bow*; symbol ∧ or ⊓

downbuckle \'=ˌ=ə=\ *n* : a generally long and relatively narrow portion of the earth's crust that has been bent sharply downward — **downbuckling** \'=ˌ=(ə)=ə=\ *n*

down-budding \'=ˌ=ə=\ *n* : a method of budding in which the scion is inserted in an inverted position

downbye *also* **downby** \(ˌ)dau̇n'bī\ *adv* [*down* + *by*, adv.] *Scot* : down that way : down below

down calver *n* [*down* + *calve* + *-er*] *Brit* : a down-calving cow

down-calving \'=ˌ=ə=\ *adj* [*down* + *calving*, fr. pres. part. of *calve*] *Brit* : nearly ready to calve

down card \'=ˌ=\ *n* **1** : a card dealt face down in any card game in which certain other cards are dealt face up **2** : a card that is part of a player's hand but is left face down on the table while other of his cards are exposed **3** : HOLE CARD

[1]downcast \(ˌ)='=\ *vt* [ME *douncasten*, fr. *doun* down + *casten* to cast — more at DOWN, CAST] *archaic* : OVERTHROW, DEMOLISH; *also* : DEJECT

[2]downcast \'=ˌ=\ *n* [ME *douncast*, fr. *douncasten*, v.] **1** : a casting down : OVERTHROW **2** : a downcast or melancholy glance or appearance **3** : a ventilating shaft down which fresh air passes in circulating (as through a mine or the hold of a ship); *also* : the current of air through the shaft

[3]downcast \'=ˌ=\ *adj* [fr. past part. of *[1]downcast*] **1** : low in spirit : DEPRESSED, DISPIRITED, DEJECTED **2** *of looks* : cast downward : directed to the ground (as from bashfulness modesty, dejection, or guilt) **3** : having a downward draft ⟨a ~ mine shaft⟩

SYN DISPIRITED, DEJECTED, DEPRESSED, DISCONSOLATE, WOEBEGONE: DOWNCAST suggests utter lack of cheer, confidence, and hope, perhaps accompanied by shame, chagrin, or bashfulness ⟨their smiling faces became *downcast*, their eyes held a look of furtiveness and uneasiness —Francis Birtles⟩ DISPIRITED indicates low-spiritedness and discouragement, usu. after failure or disappointment ⟨they could make no impression, and fell back at daybreak beaten and *dispirited* —J.A.Froude⟩ ⟨a fragile, *dispirited* gentlewoman who appeared to find everything in the world immeasurably sad and who spoke mostly in the past tense —Jean Stafford⟩ DEJECTED may imply more utter lowering of spirits and remarkable loss of hope, courage, and strength ⟨timorous and *dejected*, apprehending themselves to be haunted and possessed with vengeful spirits —William Bartram⟩ DEPRESSED implies a sinking under heavy burdens, often economic ones; it may describe chronic underprivilege or indicate psychological incapacity for hope, gladness, or even purposive activity ⟨the *depressed* populations of the ghettos of the Middle East and North Africa —John Hersey⟩ ⟨*depressed* by his failures and contemplating suicide⟩ ⟨*depressed* and stolid after the manic phase⟩ DISCONSOLATE describes one so utterly dispirited that he cannot be consoled, comforted, or encouraged ⟨the Jews sat *disconsolate* on the poop; they complained much of the cold they had suffered —George Borrow⟩ ⟨the *disconsolate* frown of a hunter who has seen nothing but warblers all day —James Thurber⟩ WOEBEGONE describes the appearance of dejection and defeat, sometimes lugubrious ⟨officers, seamen, and prisoners alike, we were as gaunt and *woebegone* a crowd as had ever been cast ashore from a shipwrecked vessel —C.B.Nordhoff & J.N.Hall⟩

down-cast-ness *n* -ES : the quality or state of being downcast

down-come \'dau̇n,kəm\ *n* -S [ME (Sc) *douncome*, fr. ME *doun* down + *come* action of coming, alter. (influenced by *comen* to come) of *kime*, fr. OE *cyme*, fr. *cuman* to come — more at DOWN, COME] **1** *archaic* : a coming down : DESCENT : sudden fall : DOWNFALL : OVERTHROW **2** : DOWNCOMER a

downcomer \'=ˌ=ə=\ *n* [*down* + *comer*] : a pipe to conduct something downward: as **a** : a pipe for leading the hot gases from the top of a blast furnace downward to the dust collectors and flue system — see BLAST FURNACE illustration **b** : a tube larger in diameter than the water tubes in some watertube boilers to conduct water from each top drum to a bottom drum under the influence of thermal circulation

downcountry \'=ˌ=ə=\ *adv (or adj)* [*down* + *country*] : in, toward, or of the seaboard or peripheral regions of an area

downcourt \'=ˌ=\ *adv (or adj)* : in or into the direction of the goal (as in basketball)

downcry \(ˌ)='=\ *vt* : to cry down : DISPARAGE

downcurved \'=ˌ=\ *adj* : curved downward esp. at the end — used of projecting parts ⟨the long ~ bill of the curlew⟩

downcut \(ˌ)='=\ *vb* : to cut down or downward by or as if by erosion — used chiefly as a present participle and esp. in distinguishing between downward and lateral stream erosion

downdale \'=ˌ=\ *adv* : DOWNHILL

downdraft \'=ˌ=\ *n* -S *often attrib* : a downward current of air or other gas (as in a mine shaft, kiln, or carburetor or during a thunderstorm)

down east \(ˌ)='=\ *adv (or adj), often cap D&E* : in or into the northeast coastal section of the U. S. and parts of the Maritime Provinces of Canada; *specif* : in or into coastal Maine

down east-er \dau̇'nēstə(r)\ *n, often cap D&E* **1** : one born or living down east **2** : a ship built down east; *esp* : a sailing ship from Maine

downed *past of* DOWN

down-er \'dau̇nə(r)\ *n* -S [*[4]down* & *[4]down* + *-er*] : o... ...t downs or that takes, brings, gets, or puts down; *esp* : a weak, sick, or crippled animal in a shipping load that is down and unable to rise

downface \(ˌ)='=\ *vt* [*idown* + *face*, v.] : CONTRADICT

down-faced \'=ˌ=\ *adj* : having a continuous slope from forehead top to end of muzzle or bill with little or no stop — used of domestic mammals and birds; compare DISH-FACED

downfall \'=ˌ=\ *n* -S [ME *dounfal*, fr. *doun* down + *fal* fall — more at DOWN, FALL (noun)] **1 a** : a sudden fall from high estate, power, reputation, or happiness : DESTRUCTION, RUIN ⟨the ~ of the government⟩ **b** : a fall (as of snow or rain) esp. when sudden or heavy : DESCENT **2** *a archaic* : a precipitous descent : ABYSS **b** : a trap having some device that falls and imprisons or injures the prey when the trap is sprung — compare DEADFALL **c** : something that causes a downfall (as of a person) ⟨drink was his ~⟩

downfallen \'=ˌ=ə=\ *adj* [*down* + *fallen*] : FALLEN, RUINED

downfalling \'=ˌ=ə=\ *adj* [*down* + *falling*, adj.] *archaic* : falling down : DECAYING

downfaulted \'=ˌ=ə=\ *adj* [*down* + *faulted*, fr. past part. of *fault*] *of a geological formation* : lowered by faulting

downfield \'=ˌ=\ *adv (or adj)* [*down* + *field*] : in or into the part of a football field beyond the line of scrimmage toward the opposing team's goal ⟨a play should be planned to allow the ends to get ~ if needed⟩ ⟨effective ~ blocking⟩

downflow \'=ˌ=\ *n* : a downward flow or something that flows down; *esp* : a downward flowing current of air

downflowing \'=ˌ=ə=\ *adj* : running or cascading down

downfold \'=ˌ=\ *n* : SYNCLINE — **downfolded** \'=ˌ=ə=\ *adj*

down-gone \'dau̇n,gȯn *also* -gən\ *adj* [prob. alter. (influenced by *[2]down* and *gone*, past part. of go) of *[2]doggone*] *dial* : in poor condition : DISTRESSED; *often* : DARNED, DOGGONE

[1]downgrade \'=ˌ=\ *n* [*down* + *grade*, n.] **1** : a downward grade (as of a road) **2** : a descent toward an inferior state : DETERIORATION — used esp. in the phrase *on the downgrade*

[2]downgrade \'=ˌ=\ *adv (or adj)* : DOWNHILL ⟨the road dips ~⟩ ⟨the crossing where the ~ freights hit so many buggies and teams —Wright Morris⟩

[3]downgrade \(ˌ)='=\ *vt* [*idown* + *grade*, v.] **1** : to minimize or depreciate in grade ⟨the folly of *downgrading* Soviet technology⟩ ⟨those countries preparing to ~ their commitments to NATO⟩ **2 a** : to lower the market class of (as grain or produce) esp. because of impurities or defects ⟨several carlots of wheat were *downgraded* for excessive cockle⟩ **b** : to alter the status of (a workman or his job) so as to lower the rate of pay ⟨older workers may often be kept employed by *downgrading* them to jobs that they are still able to handle⟩ ⟨any major shift in production or methods is likely to require extensive *downgrading* of jobs⟩ **3** : to assign (as a document) to a less restricted classification of security

downgrowth \'=ˌ=\ *n* : the growing downward of a structure; *also* : the product of such growth

down-gyved *adj* [*down* + *gyved*, fr. past part. of *gyve*] *obs* : hanging down like gyves

downhand \'=ˌ=\ *adj* [prob. fr. *[3]down* + *hand*, n.] *of welding* : performed from the upper side of the joint with the face of the weld approximately horizontal

downhaul \'=ˌ=\ *n* [*down* + *haul*, v.] : a rope or line for hauling down or holding down a sail or spar ⟨a staysail ~⟩

downhearted \'=ə=\ *adj* : DEJECTED — **down-heart-ed-ly** \(ˌ)='=ə=\ *adv*

down-heart-ed-ness *n* -ES : the quality or state of being downhearted

[1]downhill \'=ˌ=\ *n* [*down* + *hill*] **1** *archaic* : the slope toward the bottom of a hill : DECLIVITY, DESCENT **b** : a descending gradient (as in circumstances or human existence) ⟨the tragic ~s that bring many promising careers to an end⟩ **2** [*downhill*] : a competitive ski event consisting of skiing down a trail against time

[2]downhill \'=ˌ=\ *adv* [*down* + *hill*] **1** : toward the bottom of a hill ⟨traveling ~ we really got up speed⟩ **2** : toward a lower, poorer, or inferior state or level — used esp. in the phrase *go downhill* < the town has gone ~ since the mill closed⟩ ⟨after he retired he went ~ very rapidly⟩

[3]downhill \'=ˌ=\ *adj* [*[2]downhill*] **1** : sloping downhill **2** [*[1]downhill* 2] : of, relating to, or designed for use in skiing downhill ⟨a leading ~ contestant⟩ ⟨attractive ~ trousers⟩

downhill turn *n* : any skiing turn down the slope from a traverse run

downhold \'=ˌ=\ *n* : an act of minimizing (as of expenses) ⟨a stringent ~ on cable tolls⟩

down-house \'=ˌ=\ *adv* [*down* + *house*] *dial Brit* : DOWNSTAIRS

downier *comparative of* DOWNY

downiest *superlative of* DOWNY

down-i-ly \'dau̇nᵊlē, -nəlē\ *adv* : in a downy manner : ARTFULLY

down-i-ness \'dau̇nēnəs, -au̇nin-\ *n* -ES : the quality or state of being downy

downing *pres part of* DOWN

dow-nin-gia \dau̇'niŋ(g)ēə\ *n, cap* [NL, fr. Andrew J. *Downing* †1852 Am. horticulturist + NL *-ia*] : a small genus of annual dwarf American herbs (family Lobeliaceae) with alternate leaves and showy sessile flowers having an unsplit corolla tube

down-in-the-mouth \ˌ=ə=\ *adj* : DEPRESSED, DOLOROUS

down-land \'=ˌland\ *n* : [1]DOWN 2

down-lead \'=ˌlēd\ *n* : a radio lead-in

down-less \'=ləs\ *adj* : having or growing no down ⟨a ~ chick⟩

downlight \'=ˌ=\ *n* : a small spotlight set in the ceiling and directed downward

downline \'=ˌ=\ *adv* [*down* + *line*, n.] : down the railway line

down lock *n* : device in an airplane that locks the landing gear in the down position after it has been lowered

down-looked \'=ˌlu̇kt\ *adj* [*down* + *look*, n. + *-ed*] *archaic* : downcast in countenance as or as if from guilt : SHEEPISH

downlying \'=ˌ=ə=\ *n* -S [*down* + *lying*, fr. gerund of *lie*] **1** *now dial Eng* : the time or act of going to bed : time of repose **2** *also* **down-lig-ging** \'=ˌligən, -gig\ [*downligging* fr. *[2]down* + *ligging*, fr. gerund of *lig*] *chiefly Scot* : LYING-IN

down milling *n* [*down* + *milling*] : CLIMB MILLING

down-most \'=ˌmōst *sometimes chiefly Brit* -ˌməst\ *adv (or adj)* : farthest down

down-ness \'dau̇nnəs\ *n* -ES : the state or condition of being down

downpipe \'=ˌ=\ *n, Brit* : DOWNSPOUT

downpour \'=ˌ=\ *n* : a pouring or streaming downward (as of sunlight); *esp* : a heavy drenching

[1]downright \'=ˌ=\ *adv (or adj)* [ME *dounright*, fr. *doun* down + *right*, adv. — more at DOWN] **1** *archaic* : straight down : in a perpendicular course **2** : OUT-AND-OUT, PLAIN, OUTRIGHT ⟨I was ~ ashamed of our party⟩ ⟨a ~ liar⟩; *sometimes* : VERY : to the utmost degree ⟨the sunset was ~ lovely⟩ **3** : without ceremony : with plain blunt honesty : FORTHRIGHT ⟨a ~ answer⟩ ⟨so ~ a moralist⟩ ⟨he was kind but ~⟩ ⟨went ~ to his task⟩ — **down-right-ness** \'=ˌ=nəs\ *n*

[2]downright \"\ *n* : an inferior short-staple wool — usu. used in pl.

down-right-ly \'=ˌ=lē, -li\ *adv* [*downright* + *-ly*] : in a straightforward or forthright manner : without hesitation

downriver \'=ˌ=ə=\ *adv (or adj)* [*down* + *river*] : from, toward, or at a point near the mouth of a river ⟨drifted ~ on a raft⟩ ⟨important ~ markets⟩

downs *pl of* DOWN, *pres 3d sing of* DOWN

down-set \'dau̇n,set\ *n* [*down* + *set*, v.] *Scot* : a provision of money or an establishment; *specif* : MARRIAGE SETTLEMENT

down-sexed \'dau̇n,sekst\ *adj* [*down* + *sexed*] : having sex appeal minimized ⟨*down-sexed* illustrations⟩

[1]downshift \'=ˌ=\ *vi* [*down* + *shift*, v.] : to shift an automotive vehicle into a lower gear (~ into low or second gear)

[2]downshift \"\ *n* : a shift into a lower automotive gear

downside \'=ˌ=\ *n* **1** : the under or lower side ⟨a gaily tilted hat with a decorative clasp on the ~⟩ **2** : a trend downward (as of prices) — used chiefly in the phrase *on the downside*

downside up *adv* : TOPSY-TURVY

downsitting \'=ˌ=ə=, *Scot* 'dau̇n-\ *n* [*down* + *sitting*, fr. gerund of *sit*] **1** : the action of sitting down : REPOSE **2** *Scot* : DOWNSET

downslide \'=ˌ=\ *n* : a decline to a lower level (as of prices or business)

[1]downslope \'=ˌ=\ *adv* [*[3]down* + *slope*] : in a downward direction : DOWNHILL ⟨khaki-clad figures . . . sliding ~ toward him —Walt Sheldon⟩

[2]downslope \"\ *adj* : DOWNHILL, DESCENDING ⟨~ winds⟩ ⟨~ movement of ice⟩

[3]downslope \'=ˌ=\ *n* [*down* + *slope*] : DOWNHILL ⟨he had only to remember to keep the ~ on his right —W.V.T.Clark⟩

downs-man \'dau̇nzmən\ *n, pl* **downsmen** [*downs* (pl. of *[1]down*) + *man*] : a dweller on the downs

down-some \'dau̇n(t)səm\ *adj* : DISPIRITED, DEPRESSED

down south \'=ˌ=\ *adv, often cap S* : in or into a more southerly location (learned about the ways of fish in Canadian waters before he came *down south* —*Sydney (Australia) Bull.*); *esp* : in or into the southeastern part of the U.S.

downspout \'=ˌ=\ *n* : a pipe leading downward; *esp* : a pipe to carry off rain water from a roof

down's syndrome \'dau̇nz-\ *n, cap D* [after J.L.H. *Down* †1896 Eng. physician, who first described it] : MONGOLISM

[1]downstage \'=ˌ=\ *adv (or adj)* [*down* + *stage*, n.] : toward or at the front of a theatrical stage ⟨swept her train ~⟩ ⟨bent the ~ knee⟩ — compare UPSTAGE

[2]downstage \'=ˌ=\ *n* : the front of a stage immediately behind the footlights

[1]downstairs \(ˌ)='=\ *adv* [*down* + *stairs*, pl. of *stair*] **1** : down the stairs : on or to a lower floor **2** *aeronautics* : on, near, or to the ground

[2]downstairs *also* **downstair** \'=ˌ=\ *adj* **1** : situated on the main, lower, or ground floor of a building **2** : placed at or occupying a lower level ⟨the ~ television channels⟩

[3]downstairs \(ˌ)='=\ *n pl but sing or pl in constr* **1** : the part of the house belowstairs : the lower floor or floors **2** : persons occupying the lower part of a building; *often* : the servants of a household ⟨~ were shocked at such goings on⟩

downstart \'=ˌ=\ *n* [*down* + *-start* (as in *upstart*)] : an Irishman of good birth and upbringing but with little fortune; *often* : a younger son of good family

[1]downstate \'=ˌ=\ *adv (or adj)* [*down* + *state*, n.] **1** : into or in a part of a state designated as downstate ⟨the voting was light ~⟩ **2** : characteristic of a part of a state designated as downstate ⟨peculiarities of ~ pronunciation⟩

[2]downstate \"\ *n* : the more southerly part of a state of the U.S. as distinguished from a northerly part conventionally designated as *upstate* — **down-stat-er** \'=ˌstād-ə(r)\ *n* -S

downstream \'=ˌ=\ *adv (or adj)* [*down* + *stream*, n.] : down a stream : in the direction of flow of a stream

downstreet \'=ˌ=\ *adv* [*down* + *street*, n.] : to, toward, or in the main retail business section of a town ⟨going ~ after supper⟩

downstroke \'=ˌ=\ *n* **1** : a stroke (as of a piston in a cylinder or of a conductor's baton) made in a downward direction **2 a** : a stroke (as of a handwritten cursive letter) commonly written in a downward direction and in some styles heavier than an upstroke **b** : a corresponding stroke of a printed letter

downsun \'=ˌ=\ *adv (or adj)* [*down* + *sun*, n.] : in a direction from or out of the sun ⟨a ~ attack by an aircraft⟩

downswing \'=ˌ=\ *n* **1** : a swing downward; *esp* : the forward and downward sweep of a golf club following the backswing **2** : a downward or depressed trend ⟨the ~ in interest in politics⟩ ⟨in the ~ of a cyclic mania⟩; *esp* : the contraction phase of a business cycle

downtake \'=ˌtāk\ *n* [*down* + *-take* (as in *intake*)] : a pipe, duct, or flue (as for air, gas, or water) that leads downward

down-the-line \ˌ=ə'=\ *adv (or adj)* : all the way : to the end ⟨supporting the party ticket right *down-the-line*⟩ ⟨a *down-the-line* union man⟩

down the river *n, often cap D&R* : SEVEN-CARD STUD

downthrow \'=ˌ=\ *n* **1** : the act or process of throwing down : state of being overthrown : OVERTHROW ⟨the sudden ~ of a reputation⟩ **2** : the side of a geologic fault that moved downward relative to the other side — compare THROW

downthrown \'=ˌ=\ *adj* [*down* + *thrown*, fr. past part. of *throw*] : thrown down : DEPRESSED

downthrust \'=ˌ=\ *n* : downward movement of an object under impact or steady pressure; *also* : an impact or pressure tending to cause downthrust

downtime \'=ˌ=\ *n* [*down* + *time*] **1** : time during which a machine, department, or factory is inactive during normal operating hours (as for repairs or setting up or from lack of materials) **2 a** : a period during which an incentive worker is unable to produce because of plant factors beyond his control and therefore receives payment at an agreed base rate **b** : money paid a worker for downtime

down-to-date \'=ˌ=ˌ=\ *adj* : UP-TO-DATE

down-to-earth \ˌ=ə'=\ *adj* : practical and straightforward : having no frills or foibles : REALISTIC

down-to-mi-an \ˌ(ˌ)dau̇n-ˌtōmēən\ *adj, usu cap* [*Downton*, town in Wiltshire, England + E *-ian*] : of, relating to, or constituting a subdivision of the European Silurian — see GEOLOGIC TIME table

[1]downtown \'=ˌ=\ *adv (or adj)* [*down* + *town*] **1** : to, toward, or in the lower part or business center of a city ⟨this bus goes ~⟩ ⟨delinquents roaming the ~ streets⟩ **2** : relating to or characteristic of the business center of a city ⟨always patronizes the ~ stores⟩

[2]downtown \"\ *n* : the business center of a city ⟨the ~s of a hundred cities dressed and lighted for Christmas⟩ — **downtown-er** \'=ˌtau̇nə(r)\ *n* -S

down tree *n* [*down* + *tree*; fr. the thick cottony fibers surrounding the seeds] : BALSA 1

downtrend \'=ˌ=\ *n* : a tendency downward esp. in economic matters ⟨a persistent ~ in sales⟩

downtrod *obs var of* DOWNTRODDEN

down-trod-den \(ˌ)='=ˌträdᵊn\ *adj* [*down* + *trodden*, fr. past part. of *tread*] : abused by superior power — **down-trod-den-ness** \'=ᵊn(ə)nəs\ *n* -ES

downturn \'=ˌ=\ *n* : an act or instance of turning down ⟨the ~ of an anticlinal fold —W.Y.Westervelt⟩; *also* : the state of being turned down ⟨the ~ of her mouth became a habit —Dorothy Parker⟩ **2** : DECLINE, DECREASE ⟨a sharp ~ in new construction⟩; *usu* : a downward trend in economic matters ⟨the ~ of prices⟩ ⟨business began to show a ~⟩

down-twister \'=ˌ=ə=\ *n* : a textile manufacturing machine with downward feeds for plying yarn while adding some twist — compare UP-TWISTER

[1]down under *adv* [*down* + *under*, adv.; fr. the conception of the antipodes as being located beneath one's feet] : into or in Australia or New Zealand

[2]down under *n, sometimes cap D&U* : ANTIPODE 2

[1]down-ward \'dau̇nwə(r)d\ *also* **down-wards** \-dz\ *adv* [*downward* fr. ME *dounward*, fr. *doun* down + *-ward*; *downwards* fr. ME *dounwardes*, fr. *dounward* + *-es* (adverbially functioning gen. sing. ending of nouns) — more at DOWN, -S] **1** : from a higher place to a lower : in a descending course ⟨looking ~ to the grass⟩ ⟨the streams roll ~ to the sea⟩ **2** : from a higher to a lower condition ⟨revised his estimate ~⟩ : toward misery, humility, disgrace, or ruin ⟨fell from grace and went ~ in life⟩ **3** : from an ancestor or earlier time : from an ancestor or predecessor : from one to another in a descending line ⟨prophets from Elijah ~ who preached repentance⟩

[2]downward \"\ *adj* [ME *dounward*, fr. *dounward*, adv.] **1** : moving or extending from a higher to a lower place : tending toward the earth or its center or toward a lower level ⟨the ~ pull of gravity⟩ **2** : descending from a head, origin, or source ⟨a ~ line of descent⟩ ⟨the ~ course of a stream⟩ **3** *a archaic* : tending to a lower state : DEJECTED **b** : directed toward or leading to ruin, destruction, or damnation ⟨a man on the ~ path⟩ ⟨took her ~ way⟩ **c** : DEBASING ⟨the scripture contains many ~ comparisons of man and his ways⟩ **4** *archaic* : being below : LOWER — **down-ward-ly** *adv* — **down-ward-ness** *n* -ES

[1]downwarp \(ˌ)='=\ *vb* [*down* + *warp*, v.] *vt* : to cause or produce a downwarp in ~ *vi* : to undergo downwarping

[2]downwarp \'=ˌ=\ *n* : a broad generally shallow geological downfold

downwash \'=ˌ=\ *n* **1** : material washed downward (as from a mountainside) **2** *aeronautics* : the airstream which is

glad·stone \'gladz,tōn, -d,st-, *chiefly Brit* -,t
bag *n -s often cap G* [after William E. *Gladstone* †1898 Brit. statesman] : a traveling bag typically of leather and about two feet long with flexible sides on a rigid steel frame and opening flat into two equal compartments


gladstone

glad·sto·ni·an \(')gladz'tōnēən, -d,st-\ *adj, usu cap* [William E. *Gladstone* †1898 + E *-ian*] : of, relating to, or characteristic of W.E.Gladstone, his political policies, or the party that supported him

glady *also* **glad·ey** \'glādē\ *adj* **gladier; gladiest** [*glade* + *-y*] **1 a** : having glades; *esp* : full of glades ⟨a ~ countryside⟩ **b** : resembling a glade ⟨it was a ~ place, and ferns and moss grew all around —H.E.Giles⟩ **2** : having a shallow soil and limestone outcrops ⟨extensive ~ areas wherein well-preserved fossils are abundant —*Jour. of Geol.*⟩

gla·gah *or* **gla·ga** \'glägə\ *n -s* [Malay *gĕlagah*] : KANS

glag·o·lit·ic \,glägə'lid·ik\ *also* **glag·o·lith·ic** \-'lithik\ *adj, usu cap* [irreg. fr. Serbo-Croatian *glagolica* Glagolitic alphabet + E *-ic*] : written in, constituting, or belonging to an alphabet of which the invention is attributed to St. Cyril in the 9th century A.D. and which was formerly used in writing various Slavic languages but is now used only in Catholic liturgical books in a limited area along the eastern coast of the Adriatic — compare CYRILLIC ALPHABET

gla·go·li·tsa \,glägō'gōlē̇tsə, -gə̄l\ *n -s usu cap* [Serbo-Croatian *glagolica;* akin to OSlav *glagolŭ* word, *glasŭ* voice — more at CALL] : the Glagolitic alphabet

glaik \'glāk\ *n -s* [origin unknown] **1** *glaiks pl, chiefly Scot* : derisive deception : MOCKERY **2** *chiefly Scot* : a flash of light

glai·kit *or* **glai·ket** *or* **gla·ked** \'glākət, -ēd\ *adj* [ME (Sc) *glaikit, glakit*] *chiefly Scot* : showing a lack of common sense and good judgment : FOOLISH, SILLY, GIDDY

¹glair *or* **glaire** \'gla(ə)(ə)r, -le|, |ə\ *n -s* [ME *gleyre* white of an egg, fr. MF *glaire*, fr. OF, modif. of (assumed) VL *claria*, fr. L *clarus* clear — more at CLEAR] **1** : a sizing liquid made from egg white beaten with vinegar and applied to book covers before laying on gold leaf or to book edges before gilding **2** : a viscid or slimy substance suggestive of the white of an egg

²glair *or* **glaire** \"\ *vt* -ED/-ING/-S : to apply glair to ⟨~*ed* book edges⟩

glair·e·ous \|rēəs\ *adj* [*¹glair* + *-eous*] *archaic* : GLAIRY

glair·i·ness \|rēnə̇s\ *n -ES* : the quality or state of being glairy

glairy \|rē\ *adj* -ER/-EST [*¹glair* + *-y*] **1** : having the characteristics of glair ⟨VISCID, SLIMY ⟨~ mucus⟩ **2** : overlaid with or as if with glair ⟨a sticky ~ surface⟩

glais·tig *or* **glas·tig** \'glashtig\ *n -s* [ScGael *glaistig*] : a female sprite in Celtic mythology

glaive \'glāv\ *n -s* [ME *glaive, gleyve*, fr. OF *glaive* javelin, modif. of L *gladius* sword — more at GLADIATOR] **1** *obs* : HALBERD **2** *archaic* : SWORD; *esp* : BROADSWORD

glaiz·ie \'glāzē\ *Scot var of* GLAZY

glam \'glam\ *var of* GLAUM

gla·mor·gan·shire \glə'mȯrgən,shi(ə)r, -,shər\ *or* **glamorgan** *adj, usu cap* [fr. *Glamorganshire, Glamorgan*, county in Wales] : of or from the county of Glamorgan, Wales ; of the kind or style prevalent in Glamorgan

glam·or·iza·tion \,glaməˌrə'zāshən, -ˌrīˈz-\ *n -s* : the act of glamorizing or the process of being glamorized

glam·or·ize *also* **glam·our·ize** \'ˌrīz\ *vt* -ED/-ING/-S **1** : to make glamorous ; add glamour to ; make more attractive esp. in a superficial illusory way ⟨*glamorizing* a living room⟩ **2** : to attribute glamour to ; look upon as glamorous ; view or treat (as in writing) romantically : IDEALIZE, ROMANTICIZE, GLORIFY ⟨*glamorizing* war⟩ ⟨poverty *glamorized* into something alluring —Rose Thurburn⟩ — **glam·or·iz·er** \-zə(r)\ *n -s*

glam·or·ous *also* **glam·our·ous** \'glam(ə)rəs\ *adj* : characterized by or full of glamour : FASCINATING, ENCHANTING, ALLURING ⟨~ movie stars⟩ — **glam·or·ous·ly** *adv* — **glam·or·ous·ness** *n -ES*

¹glam·our *or* **glam·or** \'glamə(r)\ *n -s* [Sc *glamour, glamer*, alter. of E *grammar;* fr. the popular association of erudition with occult practices] **1** : a magic spell : BEWITCHMENT ⟨the girls appeared to be under a ~ —Llewelyn Powys⟩ ⟨casting a ~ over the affairs of merchant princes —O.S.J.Gogarty⟩ **2** : an elusive mysteriously exciting and often illusory attractiveness that stirs the imagination and appeals to a taste for the unconventional, the unexpected, the colorful, or the exotic ⟨the ~ of the French Foreign Legion⟩ ; a strangely alluring atmosphere of romantic enchantment ⟨a beautifully decorated room that was filled with ~⟩ ; a bewitching intangible irresistibly magnetic charm ⟨it was simply the ~ of the unknown that she had felt in him —Ellen Glasgow⟩; *often* : personal charm and poise combined with unusual physical and sexual attractiveness ⟨an actress radiant with ~⟩

²glamour \"\ *vt* glamoured; glamoured; glamouring \-m(ə)riŋ\ **glamours** [Sc, fr. *glamour, glamer*, n.] **1** : to cast a magic spell upon : BEWITCH ⟨soon created such a realm of gorgeous marvel as ~*ed* the age with fantasy —H.B.Alexander⟩ **2** : GLAMORIZE ⟨*glamoured*-up blondes were a dime a dozen — Raymond Chandler⟩

glamour boy *n* : a man (as an actor or adventurer) with whom glamour is esp. associated

glamour girl *n* : a woman (as an actress or model) with whom glamour is esp. associated

glam·ou·rie *or* **glam·ou·ry** \-mərē\ *n, pl* **glamouries** [Sc, alter. of *glamour, glamer*, n.] *archaic* : GLAMOUR 1

glam·our·less \-mə(r)ləs\ *adj* : devoid of glamour ⟨she was handsome in her own way —Edmund Wilson⟩

glamour puss *n, slang* : one that has a glamorously attractive face ⟨some *glamour puss* with two expressions and eighteen changes of costume —Raymond Chandler⟩

¹glance \'glan(t)s, -aə(ə)-,-ai-,-ā-\ *vb* -ED/-ING/-S [alter. of ME *glencen, glenchen*, perh. alter. of *glenten* to move quickly esp. in an oblique direction, strike something obliquely and glance aside, look sideways at something, gleam — more at GLENT] *vi* **1 a** (1) : to strike a surface obliquely so as to be deflected and go off at an angle : RICOCHET — usu. used with *off* ⟨the spear *glanced* off the heavy metal shield⟩ ⟨the bullet *glanced* off the stone wall and smashed through a window⟩ (2) : to strike a surface obliquely and bound onward at an angle often following with one or more additional oblique impacts and forward bounds : SKIP ⟨threw the small flat stone so that it *glanced* lightly across the pond⟩ (3) *of a ray of light* : to strike a reflecting surface obliquely and dart out at an angle ⟨light from the setting sun *glanced* off the oil tanks — Malcolm Lowry⟩ **b** (1) *obs* : to move swiftly (as in springing or dodging) esp. in an oblique or crosswise direction (2) : to make a glance in cricket **c** *archaic* : to move swiftly (as in speaking or writing) from one subject to another **2 a** (1) : to flash or gleam with quick intermittent rapidly successive rays of light (as those produced by sudden quick movements of a reflecting surface) : SPARKLE, SCINTILLATE, CORUSCATE ⟨clear mountain brooks *glancing* brightly in the morning sun⟩ (2) : to make sudden quick movements that cause quick intermittent flashes of light (as from a moving reflecting surface) ⟨dragonflies *glancing* and zigzagging over the pond⟩ **b** : to shine with a steady dazzling radiance : BEAM ⟨the *glancing* sun⟩ **3 a** : to touch briefly or indirectly on a subject (as in speaking or writing) ; make an incidental reference ; make an allusion — usu. used with *at* ⟨a book on contemporary civilization that often ~*s* at the customs of ancient cultures⟩ **b** : to refer briefly to something by way of censure or satire ; cast discredit on something in a passing reference ⟨full of sly *glancing* allusions to life as it is lived today —Gerald Bullett⟩ **4 a** *of the eyes* (1) : to move swiftly from one thing to another ⟨his eyes *glanced* from the judge to the jury and back again⟩ (2) *archaic* : to light upon something by or as if by chance ⟨her eye *glanced* on something which made her change color —T.L.Peacock⟩ **b** : to take a quick look at something *(glancing* at the morning headlines⟩ : look briefly, hurriedly, or cursorily ⟨*glanced* about as though fearful of being overheard —Sherwood Anderson⟩ : look around here and there ; make a quick inspection ⟨the bar, where we *glanced* first, was crowded —Scott Fitzgerald⟩ ~ *vt* **1 a** *obs* : to turn (the eyes or gaze) quickly aside or away **b** *archaic* : to turn (the eyes or ⌊ quickly or briefly toward something **c** *archaic* (1) : to take a quick look at ; view quickly ; survey rapidly (2) : to catch a glimpse of **2** *obs* **a** : to allude to **b** : to barely touch : GRAZE **3** : to give an oblique path of direction to: **a** : to throw (as a spear or stone) or shoot (as a bullet) so that the object thrown or shot glances from a surface **b** *archaic* : to aim (as an innuendo) indirectly : INSINUATE **4** *archaic* : to cause the reflection of ⟨*glanced* back the flame of the lamp merrily —Sir Walter Scott⟩ **5** : to play (a bowled cricket ball) with a glance

²glance \"\ *n -s* **1 a** (1) : a quick intermittent flash or gleam of light (as one produced by sudden quick movements of a reflecting surface) ⟨the ~ of a brightly polished sword⟩ (2) *archaic* : a sudden quick movement (as of a reflecting surface) that produces flashes or gleams of light **b** : a ray of light shining with a steady radiance : BEAM ⟨the first ~ of sunlight sends the snow slithering in soft cascades —Adrian Bell⟩ **2 a** *archaic* : a rapid oblique or crosswise movement **b** *archaic* : a deflected impact or blow **c** : a stroke in the game of cricket made with a slanted bat that deflects the ball to leg **3 a** : a swift movement of the eyes from one thing to another ⟨the suspect's shifting ~⟩ **b** : a quick, brief, hurried, or cursory look ⟨the two old ladies darting ~*s* at us and smiling secretively —William Thornton⟩ ⟨museums in which pictures of a single style or artist can be compared and enjoyed at a ~ — R.J.Goldwater⟩ ⟨it was clear at first ~ that his condition was serious —T.B.Costain⟩ **4** *archaic* **a** : a brief satirical or censorious reference to something : GIBE **b** : a brief incidental reference : ALLUSION

³glance \"\ *n -s* [G *glanz* mineral sulfide, luster, shine] : any of several mineral sulfides that are mostly dark colored and have a metallic luster

⁴glance \"\ *vt* -ED/-ING/-S [prob. fr. D *glanzen* to polish, gleam, fr. MD *glansen* to gleam, fr. *glans*, n., luster, shine, fr. MHG *glanz*, fr. OHG, fr. *glanz*, adj., bright — more at GLENT] : to give a high luster to (as by burnishing)

glance coal \"\ *n* [trans. of G *glanzkohle*, fr. *glanz* luster, shine + *kohle* coal] : a hard lustrous coal; *esp* : ANTHRACITE

glance pitch *n* [*²glance*] : a pure asphalt — compare MANJAK

glanc·er \-sə(r)\ *n -s* [*glance* +' *-er*] : FENDER SKID

glancing *adj* [fr. pres. part. of *¹glance*] **1** : INCIDENTAL, INDIRECT ⟨the book has a variety of ~ references to prominent personalities⟩ **2** : CASUAL, UNSTUDIED, OFFHAND ⟨a citizen of the world who knew the Near East with the same ~ familiarity —H.V.Gregory⟩ ⟨he evoked the town and its surrounding countryside with his habitual ~ art —*Times Lit. Supp.*⟩ — **glanc·ing·ly** *adv*

glancing angle *n* [*glancing* fr. gerund of *¹glance*] : the angle between an incident beam (as of X rays or electrons) and the surface upon which it is incident : the complement of the angle of incidence

glancing boom *n* : FENDER BOOM

gland \'gland, -aa(ə)-\ *n -s* [F *glande* gland (organ of secretion), glandular swelling esp. on the neck, fr. MF, acorn, gland (organ of secretion), glandular swelling esp. on the neck, fr. OF, acorn, glandular swelling esp. on the neck, fr. *glant, gland* acorn, fr. L *gland-, glans;* akin to Gk *balanos* acorn, Lith *gilė*] **1 a** : a cell or group of cells that selectively removes materials from the blood, concentrates or alters them, and secretes them for further use in the body or for elimination from the body and that typically consists of columnar or cuboidal epithelium resting on a basement membrane that is surrounded by a plexus of blood vessels — see ENDOCRINE, EXOCRINE, HOLOCRINE, MEROCRINE **b** : any of various animal structures suggestive of glands though not glandular in function: as (1) : LYMPH GLAND (2) *pl* : GLANS **c** *glands pl* : a diseased or inflamed condition of glands (as the lymph or salivary glands of the neck) **2 a** : any of various special secreting organs of plants: as (1) : one or more of the hairs on the leaves of sundew (2) : one or more of the extrafloral nectaries of many plants **b** : any of certain small protuberances of plants (as on the petiole of a peach leaf)

²gland \"\ *n -s* [origin unknown] **1** : a device (as a series of carbon rings or of interlocking teeth) for preventing leakage of steam, water, gas, or other fluid past a joint (as in machinery); *specif* : the movable part of a stuffing box by which the packing is compressed **2** : a short tube fitted to the envelope of a balloon or airship so that a rope may slide through without causing leakage

gland·ered \'glandə(r)d, -laan- *sometimes* -lān-\ *adj* : affected with glanders ⟨a ~ horse⟩

glan·der·ous \-d(ə)rəs\ *adj* **1** : GLANDERED **2** : produced by or resembling the effects of glanders ⟨a ~ condition⟩

glan·ders \-də(r)z\ *n pl but sing or pl in constr* [MF *glandres*, pl. of *glandre* glandular swelling esp. on the neck, fr. OF, fr. L *glandula*, dim. of *gland-, glans* acorn] : a highly contagious and very destructive disease of horses and other equines or sometimes of other animals (as dogs, guinea pigs, or man) that is caused by a bacterium (*Actinobacillus mallei* syn. *Malleomyces mallei* or *Pfeifferella mallei*) and that is characterized by caseating nodular lesions which tend to break down and form ulcers in mucous membranes, skin, and visceral organs and esp. in lymph nodes and along the course of lymphatic vessels and which may be accompanied by fever and edema and secondary symptoms referable to pulmonary, gastrointestinal, or other special organ involvement — compare FARCY

glandes *pl of* GLANS

gland·less \'glandləs, -laan-, *rapid* -nl-\ *adj* : devoid of glands

gland of bar·tho·lin \-,bärˈtōlən\ *usu cap B* [after Kaspar *Bartholin* †1738 Dan. physician] : either of two oval racemose glands lying one on each side of the lower part of the vagina and secreting a lubricating mucus

gland of bow·man \-'bōmən\ *usu cap B* [after Sir William *Bowman* †1892 Eng. ophthalmic surgeon] : any one of the tubular and often branched glands occurring beneath the sensory epithelium of the nose

gland of brunner *usu cap B* : BRUNNER'S GLAND

gland of cowper *usu cap C* : COWPER'S GLAND

gland of external secretion : EXOCRINE GLAND

gland of internal secretion : ENDOCRINE GLAND

gland of lieberkühn *usu cap L* : LIEBERKÜHN'S GLAND

gland of moll \-'mōl, -ȯ-,-ä-\ *usu cap M* [after Jacob A. *Moll* †1914 Du. ophthalmologist] : any of the small glands near the free margin of each eyelid regarded as modified sweat glands

gland of ty·son \-'tīs°n\ *usu cap T* [after Edward *Tyson* †1708 Eng. anatomist] : any of the small glands at the base of the glans penis that secrete smegma

glands *pl of* GLAND

glan·du·la \'glanjələ\ *n, pl* **glandu·lae** \-,lē, -,lī\ [NL, fr. L, glandular swelling esp. on the neck] : ¹GLAND 1; *esp* : a small gland

glan·du·lar \-lə(r)\ *adj* [F *glandulaire*, fr. *glandule* glandula, fr. L *glandula*] **1 a** (1) : of, relating to, or involving glands or gland cells ⟨~ cancer⟩ ⟨~ functions⟩ (2) : derived from glands or gland cells ⟨~ secretions⟩ **b** : having the characteristics or function of a gland ⟨~ tissue⟩ **c** : containing, bearing, or made up of glands or gland cells ⟨~ organs⟩ **2 a** : controlled or influenced by the secretions of glands; *esp* : resulting from abnormal functioning of glands ⟨the theory of ~ criminal behavior⟩ **b** : INNATE, INHERENT, INSTINCTIVE ⟨he had grown up with a ~ dislike for everything pretentious⟩ **c** : EARTHY, PHYSICAL; *esp* : SEXUAL ⟨he has adopted, as an interim substitute for love, an entirely ~ relationship with the proprietress of his café —W.M.Frohcok⟩ — **glan·du·lar·ly** *adv*

glandular epithelium *n* : the epithelium that forms the secreting surface of a gland

glandular fever *n* : INFECTIOUS MONONUCLEOSIS

glan·du·lif·er·ous \,glanjəˈlifərəs\ *adj* [obs. E *glandule* glandula, glandular swelling esp. on the neck (fr. MF, glandula) + E *-i-* + *-ferous*] : bearing small glands

glan·du·los·i·ty \,glanjəˈläsəd·ē\ *n -ES* [L *glandulosus* glandulous + E *-ity*] : the quality or state of being glandulous

glan·du·lous \'glanjələs, -laan-\ *adj* [ME *glandelous*, fr. MF *glanduleus*, fr. L *glandulosus*, fr. *glandula* + *-osus* -ose] : GLANDULAR — **glan·du·lous·ness** *n -ES*

gla·nen·che·li \glə'neŋkəˌlī\ *n pl, cap* [NL, fr. *glan-* (fr. Gk *glanis* sheatfish) + *-encheli* (fr. Gk *enchelys* eel) — more at ANGUIS] *in some classifications* : a suborder of Ostariophysi comprising the electric eels

glan·i·os·to·mi \,glanēˈästəˌmī\ *n pl, cap* [NL, fr. *glanio-* (fr. Gk *glanis*) + *-stomi*] *in some esp former classifications* : an order of fishes consisting of the sturgeons

glans \'glanz, -aa(ə)-\ *n, pl* **glan·des** \-n,dēz\ [L *gland-, glans* acorn, glans penis — more at GLAND] **1 a** *or* **glans pe·nis** \-'pēnəs\ : a conical vascular body forming the extremity of the penis **b** *or* **glans cli·to·ri·dis** \-klōˈtȯrədəs, -klīˈt-\ : a conical vascular body forming the extremity of the clitoris **2** : a nut enclosed by or seated in an involucre

glar \'glär\ *var of* GLAUR

¹glare \'gla(ə)(ə)r, 'gle|, |ə\ *vb* -ED/-ING/-S [ME *glaren;* akin to MD & MLG *glaren* to gleam, glare, OE *glæs* glass — more at GLASS] *vi* **1 a** : to shine esp. by reflection with a harsh uncomfortably brilliant light ⟨the heat was terrific, the pavements *glared* —Aldous Huxley⟩ ⟨the town was baking and *glaring* in the semitropics New York heat —Edmund Wilson⟩ ; shine with an intense disagreeable brightness ⟨the sun *glared* down relentlessly⟩ ⟨a single naked bulb *glared* pitilessly in the center of the room⟩ ; shine blindingly ⟨shielding our eyes as we crossed the white sand beach that blazed and *glared*⟩ ⟨miles of frozen snow that *glared* in the morning sunlight⟩ **b** *archaic* : to stand out offensively ; be unpleasantly conspicuous : OBTRUDE **2** : to stare with intense hostility, annoyance, or dislike ; stare angrily or fiercely : GLOWER, SCOWL ⟨where two armies ~ at each other across a geographical line —Lindesay Parrott⟩ ⟨*glared* at him as he walked in late⟩ ~ *vt* **1** : to express (as hostility) by glowering or scowling ⟨*glaring* defiance at each other —J.B.Priestley⟩ **2** *archaic* : to cause to be sharply reflected *syn* see BLAZE, GAZE

²glare \"\ *n -s* **1 a** (1) : a harsh uncomfortably bright light or reflection of light : intense disagreeable brightness ⟨the unshaded bulbs threw a cheap yellow ~ over the walls —A.P. Gaskell⟩ ⟨the ~ of publicity⟩; *specif* : painfully bright sunlight ⟨the ~ on the meadows was as blinding as if it shone on tin —Jean Stafford⟩ (2) *archaic* : the quality or state of being lustrous or glistening : SHININESS **b** : cheap showy brilliance : GARISHNESS, GAUDINESS ⟨art was partly corrupted by the fondness for ~, expensiveness, and size —F.W.Farrar⟩ **2** : a fixed glowering look : a look expressive of intense hostility, annoyance, or dislike : an angry or fierce stare : SCOWL ⟨the baleful ~ of their eyes⟩ ⟨gave the jury a ~⟩

³glare \"\ *n -s* [prob. fr. *²glare*] : a surface, sheet, or glaze of glare ice

⁴glare \"\ *archaic var of* GLAIR

glare ice *n* [prob. fr. *²glare*] : ice that has a smooth slippery glassy surface ⟨sidewalks covered with *glare ice*⟩

glare·less \'ˌlə̄s\ *adj* : free from glare ⟨opaque ~ paper⟩

gla·re·o·la \glə'rēələ\ *n, cap* [NL, dim. of L *glarea* gravel; prob. akin to L *granum* grain — more at CORN] : a genus (the type of the family Glareolidae) of Old World shorebirds that comprises the pratincoles which are closely related to the coursers

glar·e·ole \'gla(ə)rēˌōl\ *n -s* [NL *Glareola*] : PRATINCOLE

¹glareous *var of* GLAIREOUS

²glar·e·ous \'gla(ə)rēəs\ *adj* [L *glarea* gravel + E *-ous*] : growing in gravelly soil ⟨~ plants⟩

glar·i·ness \'gla(ə)rēnə̇s\ *n -ES* : the quality or state of being glary ⟨the ~ of the dusty roads⟩

glar·ing \'gla(ə)riŋ, -ler-, -rēəŋ\ *adj* [ME *glaringe*, fr. *glaren* to glare + *-inge, -ing* -ing] **1** : marked by a fixed look of hostility, fierceness, or anger : GLOWERING, SCOWLING ⟨trembled at the sight of their ~ eyes⟩ **2 a** : shining with or reflecting a harsh uncomfortably bright light : blindingly bright ⟨~ spotlights⟩ ⟨the still surface of the ~ sea⟩ **b** (1) : showily brilliant : GARISH, GAUDY ⟨~ colors⟩ (2) : vulgarly ostentatious : blatantly crude ⟨the more raffish and ~ manners of the Regency —R.E. Roberts⟩ **3** : painfully obvious : too apparent not to be noticed : FLAGRANT ⟨the gullibility with which we perpetuate ~ errors —Joseph O'Connor⟩ ⟨the self-assurance I have mentioned appears at its most ~ in a stupid man —Albert Dasher⟩ ; unavoidably noticeable ; inescapably evident : CONSPICUOUS ⟨the contrast between their words and their deeds today is ~ —O.M.Green⟩ *syn* see FLAGRANT

glar·ing·ly *adv* : in a glaring manner ⟨the need is ~ apparent⟩

glar·ing·ness *n -ES* : the quality or state of being glaring ⟨embarrassed by the ~ of this error⟩

glary \'gla(a)rē, -ler-, -rī\ *adj, usu* -ER/-EST [*¹glare* + *-y*] : shining with or reflecting a harsh uncomfortably bright light : full of glare : GLARING ⟨sun-scorched, ~, waterless pieces of rock —Harry Luke⟩

glase *obs var of* GLAZE

gla·se·ri·an fissure \glə|'zirēən-, glā|\ *n, usu cap G* [*glaserian* fr. Johann Heinrich *Glaser* †1675 Swiss anatomist + E *-ian*] : PETROTYMPANIC FISSURE

glas·gow \'glaˌ(,)skō, -laa|, -lai|, -lā|, |s(,)gō *also* 'glaz(,)gō *or* -läz-\ *adj, usu cap* [fr. *Glasgow*, city in Scotland] : of or from the city of Glasgow, Scotland ⟨the *Glasgow* shipyards⟩ : of the kind or style prevalent in Glasgow

glasite *usu cap, var of* GLASSITE

¹glass \'glas, -aa(ə)-,-ai-,-ā-\ *n -ES* [ME *glas*, fr. OE *glæs;* akin to OHG *glas* amber, OE *glær* amber, ON *gler* glass, OE *geolu* yellow — more at YELLOW] **1 a** : an amorphous inorganic usu. transparent or translucent substance consisting typically of a mixture of silicates or sometimes borates or phosphates formed by fusion of sand or some other form of silica or by fusion of oxides of boron or phosphorus with a flux (as soda, potash) and a stabilizer (as lime, alumina) and sometimes metallic oxides or other coloring agents so that a mass is produced that cools to a rigid condition without crystallization and that may be blown, cast, pressed, rolled, drawn, or cut into various forms — see CROWN GLASS, FIBER GLASS, FLINT GLASS; compare CULLET, FRIT **b** : any of various inorganic or organic substances resembling glass esp. in transparency, hardness, and amorphous nature ⟨sodium phosphate ~⟩ ⟨organic ~*es* made from plastics⟩ — compare ²GLAZE 2a **c** : a substance (as obsidian, pumice) produced by the quick cooling of an igneous magma **2 a** : something made wholly or almost wholly of glass: as (1) : a glass container; *esp* : a glass drinking vessel (as a tumbler or a goblet) (2) : a glass mirror : LOOKING GLASS (3) : a sheet of glass (as a windowpane, the plate-glass front of a display case, the glass covering of a picture) (4) : a shaped hollow protective glass covering (as the bell-shaped covering set over some clocks or plants, the chimney of most oil lamps) (5) : a slightly curved or flat piece of glass covering the dial of a watch or clock : CRYSTAL (6) : OPTICAL GLASS (7) : either piece of glass or other transparent material in a pair of glasses (8) : an hourglass or half-hour glass (9) : WEATHERGLASS **b** (1) : an optical instrument (as a telescope or microscope) or device that has one or more lenses and that is designed to aid in the viewing of objects otherwise wholly or partly incapable of being seen by the average eye ⟨the captain kept his ~ fixed on the nearby shore⟩; *specif* : BINOCULARS ⟨stole the captain's ~*es*⟩ (2) **glasses** *pl* : a device used to correct defects of vision (as nearsightedness) or to protect the eyes (as from glare, dust, flying sparks) and consisting typically of two pieces of glass designed to bend light rays or of two pieces of ordinary colored or plain glass or other transparent material that are supported by a bridge resting on the nose and by sidepieces extending over the ears ⟨she put her ~*es* on the table⟩ — often used with *pair* ⟨bought a new pair of ~*es*⟩; called also *eyeglasses, spectacles;* compare GOGGLES, PINCE-NEZ **3 a** : the quantity held by a glass container (as a drinking glass) : GLASSFUL ⟨drank two ~*es* of water⟩ **b** : the time required for one end of an hourglass or half-hour glass to empty ⟨the ship had been sighted two ~*es* earlier⟩ **4** : articles made of glass : GLASSWARE ⟨a sparkling new set of dinner ~⟩ ; glass products ⟨famous for the manufacture of beautiful ~⟩ **5** *obs* : GLOSS **6** *obs* : the organ of sight : EYE

²glass \"\ *vb* -ED/-ING/-ES *vt* **1 a** (1) : to fit, set, or equip (as a window frame) with glass ⟨only three windows had been ~*ed*⟩ ⟨pierced in through the ~*ed* upper half of the fruitshop door —H.S.Cobb⟩ (2) : to fit or equip with eyeglasses ⟨had been ~*ed* at an early age⟩ **b** : to cover or protect with glass ⟨~*ed* the picture before framing it⟩ ; enclose, case, or wall with glass ⟨sunlight streamed into the porch which had been ~*ed* in⟩ **c** : to pack and seal hermetically in glass containers for preservation or transportation ⟨~*ed* fruits⟩ ⟨~*ed* coffee⟩ — compare ³CAN 1a **2 a** : to cause to have a glassy surface or appearance : make glassy ⟨boredom ~*ed* his eyes⟩ **b** : to

gansin, fr. It *organzino*, prob. fr. *Urgench*, town in Soviet Central Asia where it was first manufactured] *obs* : a raw silk yarn formed from two or more twisted strands doubled and twisted in the reverse direction when plied is used for warp threads in fine fabrics — compare ²TRAM

or·gasm \'ȯ(r),gaz,əm\ *n* -s [NL *orgasmus*, fr. Gk *orgasm-*, fr. *organ* to grow ripe, swell, be lustful; akin to Gk *orgē* impulse, anger, OIr *ferc*, *ferg* anger, Skt *ūrj*, *ūrjā* nourishment, power, strength] **1 a** : intense or paroxysmal emotional excitement **b** : an instance or outburst of such excitement **2 a** *obs* : a condition of turgescence and physiologic excitement of a body part or organ **b** (1) : the climax of sexual excitement typically occurring toward the end of coitus; *specif* : the sudden release of tensions developed during coitus usu. accompanied in the male by ejaculation (2) : an instance of the occurrence of such a climax

or·gas·mic \(ˌ)ȯ(r)'gazmik\ *adj* **1** : like or suggestive of an orgasm **2** : tending to produce an orgasm

or·gas·tic \-astik\ *adj* [*fr. orgasm*, after such pairs as E *sarcasm: sarcastic*] : of, relating to, or being an orgasm

or·geat \'ȯr,zhē\ *n* -s [F, fr. MF, fr. *orge* barley, fr. L *hordeum* — more at HORDEUM] **1** : a nonalcoholic drink prepared from the sweetened juice of almonds and other flavorings (as orange blossom essence, rose water) and usu. served cold **2** : a sweet almond-flavored nonalcoholic syrup used as a cocktail ingredient or food flavoring — called also *sirop d'orgeat*

or·gia \'ȯ(r)jēə, -)gēə\ *n, pl* **orgia** *also* **orgias** [L, pl. — more at ORGY] : ORGY 1, 2

or·gi·ast \'ȯ(r)jē,ast\ *n* -s [Gk *orgiastēs*, fr. *orgiazein* to celebrate orgies, fr. *orgia* orgies — more at ORGY] : one who celebrates orgies

or·gi·as·tic \ˌȯ(r)jē'astik, -a(a)s,- -tēk\ *also* **or·gi·as·ti·cal** \-tikəl, -tēk-\ *adj* [Gk *orgiastikos*, fr. (assumed) *orgiastos* (verbal of *orgiazein*) + *-ikos*, -ic] **1** : tending to produce wild emotion (~ music) **2** : of or having the character or quality of an orgy — **or·gi·as·ti·cal·ly** \-tək(ə)lē, -tēk-, -li\ *adv*

orgn *abbr* organization

or·gone \'ȯr,gōn\ *n* -s [prob. fr. *orgasm* + *-one* (as in *hormone*)] : a vital energy held to pervade nature and to be accumulable for use by the human body by sitting in a specially designed box

orgue \'ȯ(ə)rg\ *n* -s [F, lit., organ, fr. L *organum* — more at ORGAN] : one of a number of long thick timbers pointed and shod with iron and formerly suspended over or in the vaulted passage behind a gateway to be let down in case of attack

or·gui·nette \ˌȯ(r)gə'net\ *n* -s [irreg. (influence of F *orgue*) fr. ¹*organ* + *-ette*] : a small portable reed organ mechanically played by turning a crank

or·gu·lous \'ȯ(r)g(y)ələs\ *also* **or·gil·lous** \-gəl-\ *adj* [ME *orgellus*, *orgulous*, fr. OF *orgueilleus*, *orgulleus*, fr. *orgueil*, *orgull* pride (of Gmc origin; akin to OHG *urguol* remarkable, distinguished) + *-eus* -ous] **1** : PROUD, HAUGHTY ⟨such ~ vaunting is best cured by bloodletting —E.G.Bulwer-Lytton⟩ **2** : SHOWY, SPLENDID ⟨the organ began — an ~ roll — and the academic procession passed slowly down the aisle —J.P. Bishop⟩ — **or·gu·lous·ly** *adv*

or·gy *also* **or·gie** \'ȯrjē, 'ȯ(ə)j-, -jī\ *n, pl* **orgies** [MF *orgie*, fr. L *orgia*, pl., fr. Gk *orgia;* akin to Gk *ergon* work — more at WORK] **1** : secret ceremonial rites held in honor of any of various deities (as of ancient Greece) and characterized by ecstatic or frenzied singing and dancing — usu. used in pl. **2** : a ritual observance or ceremony **3** : drunken revelry : CAROUSAL **4 a** : a manifestation of excessive indulgence in some predilection ⟨an ~ of speechmaking⟩ ⟨indulge in an ~ of destruction⟩ **b** : a riotous display ⟨an ~ of pink stucco⟩

or·ham·wood \'ȯrəm,ˌwu̇d\ *n* [*orham* prob. modif. of F *orme* elm (fr. L *ulmus*) + E *wood* — more at ELM] : AMERICAN ELM

ori- *comb form* [MF, fr. LL, fr. L *or-*, *os* mouth — more at ²*ORAL*] : mouth ⟨*orifice*⟩ **2** : mouth and ⟨*orifacial*⟩

-oria *pl of* -ORIUM

-o·ri·al \'ōrēəl,ˌȯr-\ *adj suffix* [ME *-oriale*, fr. L *-orius* -ory + ME *-ale* -al] : of, belonging to, or connected with ⟨*gressorial*⟩ ⟨*insessorial*⟩

¹orib·a·tid \'ōˌribəˌtid, -ˌdəˌtad-\ *or* **orib·a·toid** \'ōribəˌtȯid, -ˌdəˌbad-,ȯid\ *adj* [*oribatid* fr. NL *Oribatidae*; *oribatoid* fr. NL *Oribatoidea*] : of or relating to the Oribatoidea

²oribatid \"\ *n* -s [NL *Oribatidae*] : a mite of the superfamily Oribatoidea

ori·bat·i·dae \ˌȯrəˈbad-ə,dē\ *n pl, cap* [NL, fr. *Oribata*, type genus + *-idae*] *in some classifications* : a family of mites coextensive with the superfamily Oribatoidea

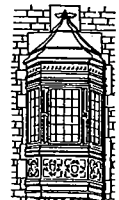
ori·ba·toi·dea \ˌȯrəbəˈtȯidēə\ *n pl, cap* [NL, fr. *Oribata* (perh. fr. Gk *orelbatēs* mountain-ranging, fr. *oros* mountain + *-batēs*, fr. *bainein* to go) + *-oidea* — more at ORIENT, COME] : a superfamily of small oval eyeless nonparasitic mites having a heavily sclerotized integument with a leathery appearance

ori·bi \'ȯrəbē\ *also* **ou·re·bi** \'u̇rə-\ *n* -s [Afrik *oribi*, prob. fr. Hottentot (Nama dial.) *arab*] : any of several small antelopes (genus *Ourebia*) of southern and eastern Africa that are tawny yellow above and white below and have straight annulated horns about five inches long

or·i·chalc *or* **or·i·chalch** \'ȯrəˌkalk\ *n* -s [L *orichalcum*, fr. Gk *oreichalkos*, lit., mountain copper, fr. *oros* mountain + *chalkos* copper — more at ORIENT, CHALC-] **1** : a yellow metallic substance considered precious by the ancient Greeks **2** : brass rich in zinc

or·i·chal·cum \ˌȯrəˈkalkəm\ *n* -s [L] : ORICHALC

ori·el \'ōrēəl, 'ȯr-\ *n* -s [ME, porch, gallery, oriel, fr. MF *oriol* porch, gallery, prob. fr. ML *auleolum* niche, small chapel, dim. of *aula* court, hall, fr. L — more at AULA] **1** : a large bay window of semihexagonal or semisquare plan projecting from the face of a wall and supported by a corbel or bracket



oriel

ori·en·cy \'ōrēənsē, 'ȯr-\ *n* -ES [*²orient* + *-cy*] : the quality or state of being orient : BRILLIANCY

¹ori·ent \'ōrēənt, 'ȯr-, -ēˌent\ *n* -s [ME, fr. MF, fr. L *orient-*, *oriens*, fr. pres. part. of *oriri* to rise, come forth — more at RISE] **1** *archaic* : the part of the firmament or of the world where the sun rises : EAST 1 — compare OCCIDENT **2** *usu cap* : EAST 2 ⟨sailed for the *Orient*⟩ **3** *archaic* : DAWN, SUNRISE **4 a** : a pearl of great luster **b** : the luster or sheen of a pearl **5** : a moderate to strong blue that is redder than average Prussian blue

²orient \"\ *adj* [ME, fr. MF, *orient*, n.] **1** *archaic* : ORIENTAL 1 **2 a** : LUSTROUS, SPARKLING ⟨~ gems⟩ **b** *archaic* : GLOWING, RADIANT ⟨with ~ colors waving —John Milton⟩ **3** *archaic* : RISING ⟨the ~ moon —P.B.Shelley⟩

³ori·ent \-ēˌent *sometimes when no syllable-increasing suffix follows* -ēənt\ *vt* -ED/-ING/-S [F *orienter*, fr. MF, fr. *orient*, n.] **1 a** : to cause to face or point toward the east; *specif* : to build (as a church or temple) with the longitudinal axis pointing eastward and the chief altar at the eastern end **b** : to define the position of in relation to the east **c** : to set or arrange in any determinate position in relation to the points of the compass **d** : to ascertain the bearings of ⟨determined to get some distance up the ridge above the hut, to ~ myself with the country —Elyne Mitchell⟩ **2** : to set right by adjusting to facts or principles : put into correct position or relation : acquaint with the existing situation ⟨will help freshmen to ~ themselves to college and to life —*advt*⟩ **3** : to direct toward : place in relation to ⟨~ youth to the responsibilities of military service —*Amer. Child*⟩ **4 a** : to direct to a given position in a chemical compound esp. about a nucleus ⟨the ~*ing* effect of the nitro group⟩ **b** : to ascertain the relative positions of atoms or groups in (a compound) **c** : to cause the axes of the molecules of (as a fiber or material) to assume the same direction (~ a fiber by stretching) ⟨highly ~*ed* cellulose⟩ **5** : to place (a crystal) so that its crystallographic axes lie in conventionally fixed directions **6** : to rotate (a map attached to a plane table) until the line of direction between any two of its points is parallel to the corresponding direction in nature

⁴ori·en·tal \ˌōrēˈent³l, 'ōr-\ *adj* [ME, fr. MF, fr. L *orientalis* of or belonging to the East, fr. *Oriens*, n., orient — more at ²*ORIENT*] **1** *often cap* : of, relating to, or situated in the Orient — compare OCCIDENTAL **2 a** : of superior grade, luster, or value ⟨used of pearls and other precious stones; compare OCCIDENTAL 3 **b** : GLOWING **c** *sometimes cap* : being corundum or sapphire but simulating another gem in color (~ amethyst⟩ ⟨~ aquamarine⟩ ⟨~ emerald⟩ **3** *often cap* : of, relating to, or having the characteristics of Orientals ⟨maintain . . . an ~ politeness and a set smile which nothing can dispel or penetrate —Joseph Chiari⟩ **4** *usu cap* : of, relating to, or constituting the biogeographic realm or region that includes Asia south and southeast of the Himalayas and the Malay archipelago west of Wallace's line — **ori·en·tal·ly** \-ᵊlē, -ᵊli\ *adv*

²oriental \"\ *n -s usu cap* **1 orientals** *pl, obs* : oriental languages **2** : a member of one of the indigenous peoples of the Orient (as a Chinese, Indian, or Japanese)

³ori·en·tal \ˌōrēˌen-'tᵊl\ *n, pl* **ori·en·ta·les** \-ˌtāˌlās\ *usu cap* [AmerSp, fr. Sp, adj., easterner, fr. L *orientalis*] : URUGUAYAN

oriental arborvitae *n, usu cap O* : an Asiatic shrub or small tree (*Thuja orientalis*) having branchlets in vertical planes — compare AMERICAN ARBORVITAE

oriental beetle *n, usu cap O* : a small beetle (*Anomala orientalis*) of the family Scarabaeidae now established in the U. S. and having a larva that feeds on the roots of grasses and sugar cane

oriental bezoar *n, usu cap O* : a bezoar composed chiefly of resinous organic matter arranged in concentric layers about a hard foreign nucleus and found in the bezoar goat or the gazelle

oriental bittersweet *n* : a vigorous European climber (*Celastrus orbiculatus*) naturalized esp. in eastern No. America and having suborbicular to broadly obovate leaves with crenate teeth

oriental blue *n* : a strong blue that is redder and darker than Sèvres and redder and duller than cerulean blue (sense 1b) — compare ORIENT BLUE

oriental bole *n* : ²BOLE 3

oriental cockroach *also* **oriental roach** *n, sometimes cap O* : a dark or blackish brown medium-sized cockroach (*Blatta orientalis*) prob. originating in Asia but now nearly cosmopolitan in warm and temperate areas esp. about dwellings — called also *Asiatic cockroach*, *blackbeetle*

oriental export porcelain *n, usu cap O* : LOWESTOFT WARE 2

oriental fruit fly *n* : a tryetid fly (*Dacus dorsalis*) that attacks many fruits, vegetables, and other plants in Hawaii, Formosa, the Philippines, and the Malay archipelago

oriental green *n* : a moderate to strong green

ori·en·ta·lia \ˌōrēən-'tālyə, ˌōr-, -ē,en--, -lēə\ *n pl, usu cap* [NL, fr. L, neut. pl. of *orientalis* oriental — more at ORIENTAL] : materials (as literary, artistic, archaeological products and remains) relating to the Orient

ori·en·tal·ism \-'entᵊlˌizəm\ *n -s often cap* **1** : a trait, custom, or habit of expression characteristic of oriental peoples **2** : learning in oriental subjects **3 a** : an oriental turn of thought adopted by a western thinker **b** : a characteristic of oriental art or culture appearing in western practice

ori·en·tal·ist \-ᵊlist\ *n -s often cap* [*orientalism* + *-ist*] : a specialist in oriental subjects ⟨a very learned ~ —*Modern Language Notes*⟩

ori·en·tal·i·ty \-ˌənˈtaləd-ē, -ˌen--\ *n* -ES : the quality or state of being oriental

ori·en·tal·iza·tion \-ˌentᵊlēˈzāshən, -ᵊlˌīˈz-\ *n -s often cap* : the act or process of orientalizing or becoming orientalized

ori·en·tal·ize \-'entᵊlˌīz\ *vb* -ED/-ING/-S *often cap* [*²oriental* + *-ize*] *vt* : to make oriental : give oriental qualities or characteristics to ⟨left the West far more *Orientalized* than the East was Hellenized —Elmer Davis⟩ ~ *vi* **1** : to become oriental : adopt oriental traits or attitudes **2** : to pursue oriental studies

oriental moth *n, usu cap O* : an Asiatic moth (*Cnidocampa flavescens*) of the family Eucleidae now established in eastern No. America and having a larva that feeds on fruit and some shade trees

oriental mustard *n* : INDIAN MUSTARD

oriental peach moth *or* **oriental fruit moth** *n, sometimes cap O* : a small moth (*Grapholitha molesta*) prob. native to Japan but now of nearly cosmopolitan distribution and having a larva that is injurious to the twigs and fruit of orchard trees and esp. to the peach

oriental pearl *n* **1** : a true or natural marine pearl **2** : SLATE GRAY

oriental plane *n, usu cap O* : a Eurasian shade tree (*Platanus orientalis*) with broad 5- to 7-lobed leaves and globose bristly fruiting heads produced in clusters of 3 to 7

oriental poppy *n, usu cap O* : an Asiatic perennial poppy (*Papaver orientale*) commonly cultivated and having stiff coarse heavily haired leaves and bright scarlet, pink, orange, or salmon-colored flowers

oriental rat flea *n* : a flea (*Xenopsylla cheopis*) that is widely distributed on rodents and is a vector of plague

oriental red *n* : GOYA

oriental rice borer *n* : a crambid moth (*Chilo simplex*) with a larva that is destructive to rice in southern and eastern Asia

oriental roller *n, usu cap O* : a tumbler pigeon originating in Asia Minor and having a longer head and tail than ordinary tumblers

oriental rug *or* **oriental carpet** *n, usu cap O* : a handwoven or hand-knotted one-piece rug or carpet made in the Orient esp. in Asia and usu. having a pile produced by knotting one or several tufts of colored woolen or silk yarn around one or usu. two warps of cotton or wool with a woof shot being passed over each row

oriental sore *n, sometimes cap O* : leishmaniasis of the skin caused by a protozoan (*Leishmania tropica*), marked by persistent granulomatous and ulcerating lesions, and distributed widely in the Orient and in tropical regions

oriental spruce *n* : an evergreen tree (*Picea orientalis*) of the Caucasus and Asia Minor that is used as an ornamental and has pendulous branchlets with brown pubescence

oriental topaz *n* : a yellow corundum used as a gem

orientalwood \ˌȯrᵊənˌəlˌwu̇d\ *or* **oriental walnut** *n, often cap O* : AUSTRALIAN WALNUT

ori·en·tate \'ōrēənˌtāt, 'ōr-, -ē,en--; ˌȯrᵊenˌtāt; *usu* -ād-+V\ *vb* -ED/-ING/-S [F *orienter* (fr. MF) + E *-ate* — more at ORIENT] *vt* : ORIENT ⟨when they come to London, colonials ~ themselves by Piccadilly Circus —Ngaio Marsh⟩ ~ *vi* : to face or turn to the east

ori·en·ta·tion \ˌōrēˌən-'tāshən *also* -ˌen--\ *n -s* **1 a** : the directing or placing of something so as to face the east; *esp* : the building of a church or temple on an east-west axis with the chancel and main altar to the east **b** : the placing of a building in any determined relation to the points of the compass **2 a** : the act of determining one's bearings or settling one's sense of direction ⟨witnessed the bee's momentary pause for ~ before it headed back to the hive⟩ **b** : the settling of a sense of direction or relationship in moral or social concerns or in thought or art ⟨reflection conducive to the individual's intellectual and spiritual ~ —*College English*⟩ ⟨America has quite a different ~ toward new music —Ernst Krenek⟩ **3** : choice or adjustment of associations, connections, or dispositions ⟨development toward a money ~ —W.E.Moore⟩ ⟨nations widely different in their political ~ —J.G.Colton⟩ **4** : introduction to an unfamiliar situation : guidance in experience or activity of a new kind ⟨the ~ program set up for the benefit of new employes —*Dun's Rev.*⟩ **5** : the change of position exhibited by some protoplasmic bodies within the cell in relation to external influences (as light or heat) or in relation to one another **6 a** : the relative positions of atoms or groups in a chemical compound esp. about a nucleus **b** : the determination of such positions — compare ³ORIENT 4 **7** *psychiatry* : awareness of the existing situation with reference to time, place, and identity of persons — **ori·en·ta·tion·al** \-ᵊshənᵊl, -shnəl\ *adj*

ori·en·ta·tor \-ād-ə(r), -ātə-\ *n -s* : an apparatus (as one in which a man seated in a partly enclosed box or cage can be subjected to the motions and stresses experienced by an airplane pilot in flight

orient blue *n* **1** : a grayish blue that is redder and paler than electric, greener than copenhagen, and redder, lighter, and stronger than Gobelin — compare ORIENTAL BLUE **2** : ORIENT 5

oriented *adj* [past part. of *orient*] **1** : DIRECTED, ADJUSTED ⟨the ~ values *wanted* throughout, associated itself with these r cent tendencies to seek a common human ethics which e valid for all mankind —Cornelius Krusé⟩ **2** : h psychological orientation ⟨on the fourth day she was alert and ~ —Milton Rosenbaum⟩

ori·ent·er *or* **ori·en·tor** \'ōrēˌentə(r)\ *n -s* : one who assists a newcomer in adjusting to a social situation or to the local routine

orienting *pres part of* ORIENT

ori·en·tite \'ōrēənˌtīt, 'ōrˌen-\ *n -s* [*Oriente*, province in eastern Cuba, its locality, + E *-ite*] : a mineral $Ca_4Mn_4Si_8O_{26}.4H_2O$ consisting of a hydrous calcium manganese silicate occurring in small brown orthorhombic crystals (hardness 4.5-5, sp. gr. 3)

orientlly *adv, obs* : in an orient manner : CLEARLY, LUSTROUSLY

orientness *n* -ES *obs* : the quality or state of being orient : BRILLIANCY

orient pink *n* : a moderate yellowish pink that is yellower and paler than coral pink and yellower and less strong than peach pink

orient red *n* : GOYA

orients *pl of* ORIENT, *pres 3d sing of* ORIENT

orient yellow *n* : CADMIUM YELLOW 2

-ories *pl of* -ORY

or·i·fice \'ȯrəfəs, 'är-\ *n* -S [MF, fr. LL *orificium*, fr. L *or-*, *os* mouth + *-ficium* (fr. *-ficus* -fic) — more at ²*ORAL*] : the mouth or opening of something : APERTURE; HOLE, VENT ⟨was obviously the ~ of entrance, because its edges were torn and lacerated —Basil Thomson⟩ — *see* CLAM *illustration*

orifice box *n* : a stilling basin under the inlet to a reservoir

orifice plate *n* : a disk containing a calibrated circular hole bolted between two abutting pipe flanges to regulate flow

or·i·fi·cial \ˌȯrəˈfishəl\ *adj* : of or relating to an orifice

or·i·flamme \'ȯrəˌflam, 'är-, -laa(ə)m\ *n -s* [ME *oriflamble*, fr. MF *oriflambe*, *orieflambe*, fr. OF, fr. ML *aurea flamma*, lit., golden flame, fr. L *aurea*, fem. of *aureus* golden (fr. *aurum* gold) + *flamma* flame — more at ORIOLE, FLAME] : a banner inspiring lively devotion or courage : a bright or glorious ensign or symbol ⟨that gallant and chivalrous spirit that has streamed like an ~ through the storms of centuries —J.L.Lowes⟩

orig *abbr* origin; original; originally

ori·ga·mi \ˌȯrəˈgämē\ *n -s* [Jap] **1** : the art or process of Japanese paper folding **2** : something (as a representation of a bird, insect, flower) made by origami

or·i·gan \'ȯrəgən\ *also* **or·i·gane** \-ˌgan, -ˌgān\ *n* -s [ME *origane*, fr. MF *origan*, *origane* wild marjoram, fr. L *origanum*] : any of various aromatic mints (as wild marjoram)

¹orig·a·num \ə'rigənəm, ȯ'-\ *or* **oreg·a·no** \ə'regəˌnō, ȯ'-\ *n -s* [*origanum*, fr. ME, fr. L, wild marjoram, fr. Gk *origanon*; *oregano* fr. Sp *orégano*, fr. L *origanum*] : any of various fragrant aromatic plants of the families Labiatae and Verbenaceae that are used as seasonings in cookery; *usu* : WILD MARJORAM

²origanum \"\ *n, cap* [NL, fr. L, wild marjoram] : a genus of Eurasian aromatic mints having small erect spikes of flowers arranged in panicles or corymbs and the calyx almost equally 5-toothed — see CRETAN DITTANY, WILD MARJORAM; compare MAJORANA

origanum oil *n* **1** : an essential oil obtained from various herbs of the genus *Origanum* formerly used in medicine and perfumery **2** : THYME OIL

¹or·i·gen·an \ˌȯrəˈjenēən, ˌär-, -jen-\ *adj, usu cap* [*Origen* †A.D. 254? Christian writer, teacher, and theologian + E *-an*] : of, relating to, or attributed to Origen

²origenian \"\ *n -s usu cap* : an adherent or follower of Origen

or·i·gen·ic \-ˈjenik\ *adj, usu cap* [*Origen* †A.D. 254? Christian writer, teacher and theologian + E *-ic*] : ORIGENIAN

or·i·gen·ism \'ȯrəjəˌnizəm, -jēˌə-\ *n -s usu cap* [*Origen* †A.D. 254? + E *-ism*] : the doctrines held by or attributed to the 3d century Christian theologian Origen who sought to work out a complete Christian philosophy based on the Scriptures and developed largely along Platonic lines

¹or·i·gen·ist \-nəst\ *n -s usu cap* [LL *origenistes*, fr. *Origen* †A.D. 254? Christian writer, teacher and theologian + L *-istes* -ist] : an advocate of Origenism

²origenist \"\ *or* **or·i·gen·is·tic** \ˌȯrəjə'nistik\ *adj, usu cap* [*origenism* + *-ist* or *-istic*] : of or relating to Origen or Origenism

or·i·gin \'ȯrəjən, 'är-\ *n* -s [ME *origine*, prob. fr. MF, fr. L *origin-*, *origo*, fr. *oriri* to rise, come forth — more at ORIENT] **1** : ANCESTRY, PARENTAGE ⟨was of humble ~⟩ **2 a** : rise, beginning, or derivation from a source ⟨had its ~ . . . when a tramp printer established it as a weekly —*Amer. Guide Series: Pa.*⟩ **b** : primary source or cause : FOUNTAIN, SPRING ⟨a letter found on his clothes tells us the ~ of the quarrel —George Meredith⟩ **3** : the more fixed, central, or larger attachment or part of a muscle — compare INSERTION **4 a** : the intersection of the axes of Cartesian coordinates **b** : any arbitrary zero from which a magnitude is reckoned

syn SOURCE, INCEPTION, ROOT, PROVENANCE, PROVENIENCE, PRIME MOVER: ORIGIN applies to a person, situation, or condition that marks the beginning of a course or development, to the point at which something rises or starts, or, sometimes, to effective causes ⟨it is probable that the *origin* of language is not a problem that can be solved out of the resources of linguistics alone —Edward Sapir⟩ ⟨the exact *origin* of the pain is not definitely known since it might reasonably be expected to appear in any unyielding tissue or it could arise from distention of the joint cavity itself —H.G.Armstrong⟩ ⟨found the *origin* of faith in an undifferentiated feeling of the Infinite and Eternal —W.R.Inge⟩ SOURCE, often interchangeable with ORIGIN, may center attention on a point of ultimate beginning whence something rises, flows, or emanates ⟨this mystery and meaning of freedom, sin, and grace are the perennial *sources* of the religious life —Reinhold Niebuhr⟩ ⟨the *source* of infection was traced to the feeding to hogs of raw garbage from ships from the Orient —*Americana Annual*⟩ ⟨the probable *sources* of civilization, roughly the three great river valleys of the Nile, the Tigris and Euphrates, and the Indus —R.W.Murray⟩ INCEPTION stresses the notion of an initiating, starting, or beginning point without implication about causes ⟨joining the group at its *inception*⟩ ⟨tin miners, who had to bring coal from south Wales, used the Watt engine from the time of its *inception* —S.F.Mason⟩ ⟨has taken part in the United States atomic energy program since its *inception* in 1942 —*Current Biog.*⟩ ROOT may suggest a first, ultimate, or fundamental source, often one not patently evident ⟨several of the large foundations . . . have been spending hundreds of thousands of dollars to get at the *root* of the trouble —J.M.Barzun⟩ PROVENANCE and PROVENIENCE designate the area, sphere, or group in which something has originated or from which it is derived ⟨any layman who is sufficiently interested in the cheese he eats to inquire about its *provenance* must have noticed how much a monastery background improves a cheese —*New Yorker*⟩ ⟨relatively recent words of scientific *provenance*, *e.g.*, appendicitis, iodine, quinine, and so on —H.L.Mencken⟩ ⟨the African *provenience* of northern Negroes —M.J.Herskovits⟩ PRIME MOVER may refer to an ultimate and original source of motive power that sets a thing moving; of personal agents it may refer to an inciter or instigator ⟨wind as the *prime mover* in impelling a sailing ship⟩ ⟨a committee on general education, in the organization of which your headmaster was a *prime mover* —A.W.Griswold⟩ ⟨evidence was also obtained implicating Heath as the *prime mover* in the affair and immediately upon Daniel's return the former was arrested —D.D.Martin⟩

¹orig·i·nal \ə'rijənᵊl, -jnəl\ *n -s* [ME, fr. MF, fr. ML *originale*, fr. L *originale*, adj., original, neut. of *originalis*] **1** *archaic* **a** : the source or cause from which something arises **b** : PARENTAGE **c** : AUTHOR, ORIGINATOR **2** *archaic* : ORIGIN 2 **3 a** : a model, pattern, or archetype that is copied **b** (1) : a primary manuscript from which copies are made (2) : a direct impression produced by a typewriter esp. when made simultaneously with one or more carbon copies **c** (1) : the person or thing represented in a photograph or an artist's work (2) : a picture or work of art from which copies are made **4** : a work composed firsthand : an artist's independent or spontaneous product ⟨caught up on their mail or . . .

outturn \'au̇t-,tərn\ *n* [*out* + *turn* (after *turn out*, v.)] **1** : an amount of something (as of a crop or of manufactured item) turned out or produced : OUTPUT, YIELD ⟨rice was the chief crop . . . and extensive new irrigation works multiplied the ~ —J.S.Furnivall⟩ **b** : a sampling taken at a paper mill from each run on a paper machine **2 a** : the quality or condition of something turned out or produced ⟨oiling of eggs has resulted in greatly improved ~ in the export pack and winter cold storage —*Poultry Farmer (Australia)*⟩ **b** : the condition in which a shipment arrives at its destination (inaugurated special methods of stowing turpentine barrels, in ships bound on long voyages, in order to assure better ~*s* —*Chem. Markets*⟩

out-turn \'au̇t-,tərn\ *n* [*out* + *turn* (after *turn out*, v.)] : a moving curling stone which is rotating counterclockwise — compare IN-TURN

outvalue \(ˌ)au̇t-'val(-ə)ü\ *vt* [*out-* + *value*] : to be worth more than ⟨the talk ~*s* many a novel —Thomas Wood †1950⟩

outvie \(ˌ)au̇t-'vī\ *vt* [*out-* + *vie*] : to surpass in a rivalry or competition ⟨*outvying* each other in courtesy⟩

outvote \(ˌ)au̇t-'vōt\ *vt* [*out-* + *vote*] **1** : to cast more votes than : defeat by a majority of votes ⟨these two groups can combine to ~ the other members of the board⟩ ⟨the outstate districts can ~ the city⟩ **2** : to defeat in a contest or on an issue decided by votes ⟨the cabinet must resign if it is *outvoted* —John Gunther⟩

outwait \(ˌ)au̇t-'wāt\ *vt* [*out-* + *wait*] : to remain waiting longer than

outwake \(ˌ)au̇t-'wāk\ *vt* [*out-* + *wake*] : to remain awake longer than : OUTWATCH

out-wale \'au̇t-ˌwāl\ *n* [*out* + *gunwale*] : the outside piece of a gunwale (as of a canoe)

outwalk \(ˌ)au̇t-'wȯk\ *vt* [*out-* + *walk*] **1** : to outdo in walking ⟨could ~ those not nearly so old as he was —John Mason Brown⟩ **2** : to walk past or beyond ⟨~*ed* the furthest city light —Robert Frost⟩

outwall \'au̇t-ˌwȯl\ *n* [*out* + *wall*] **1** *archaic* : an outer wall or other enclosure **2** *obs* : the outer enclosure of a human being (as clothing or the body) ⟨I am much more than my ~—Shak.⟩

outwander \(ˌ)au̇t-'wän(d)-ər\ *vi* [*out* + *wander*] : to wander out or away ⟨there is little ~*ing* or outgrowth from the tissues —*Science*⟩

1out-ward \'au̇twə(r)d\ *adj* [ME, fr. OE *ūtanweard*, *ūteweard*, *ūtweard*, fr. *ūtan* outside, from outside (fr. *ūt* out), *ūte* out, outside (fr. *ūt* out, & *ūt* out + *-weard* -ward — more at OUT] **1 a** : moving, directed, or turned toward the outside or away from a center ⟨the inward or ~ flow of money —*Journ. of Accountancy*⟩ ⟨the gradual ~ slope of the spur ridges —C.B. Hitchcock⟩ ⟨an ~ journey⟩ **b** : of or relating to a movement toward the outside ⟨the cost of returning a parcel includes postage, generally equivalent to the ~ charge —*Great Britain Post Office Guide*⟩ **2** : situated or lying on the outside of an enclosure or surface : EXTERIOR ⟨found the place where I was to lie . . . close and confined . . . and therefore lay all night in an ~ room —Tobias Smollett⟩ **3** : of or relating to the body and its surface appearance and clothing as opposed to the mind or spirit : BODILY, EXTERNAL ⟨~ man⟩ ⟨~ beauty⟩ ⟨~ form⟩ **4 a** : of or relating to an external act, activity, happening, or condition as distinguished from a mental or emotional process ⟨the chief ~ events of his life⟩ ⟨the new job represented a great improvement in his ~ status⟩ ⟨a feverish ~ display of energy⟩ **b** : of or relating to material objects as opposed to ideal concepts ⟨we alone wore ~ shackles —Mary Johnston⟩ **c** : of or relating to form as distinguished from essence ⟨began to find a recognized place in the ~ pattern of church life —*Eastern Churches Quarterly*⟩ **5** *dial Eng* : inclined to drink : DISSIPATED **syn** see OUTER

2outward \"\ *or* **out-wards** \-dz\ *adv* [*outward* fr. ME, fr. OE *ūtanweard*, *ūteweard*, *ūtweard*, fr. *ūtanweard*, *ūteweard*, *ūtweard*, adj.; *outwards* fr. ME *outwardes*, fr. OE *ūtweardes*, fr. *ūtweard*, adj. & adv. +- *es* -s] **1 a** : toward the outside : away from a center or starting point ⟨the eternally ~ moving stars —*N.Y. Times*⟩ ⟨the city stretches ~ for many miles⟩ **b** : from the soul or mind toward external manifestation **2** *obs* : on the outside : EXTERNALLY ⟨they have a good cover, they show well ~ —Shak.⟩

3out-ward \'au̇twə(r)d\ *n* -s [*1outward*] **1** : external form or appearance : OUTSIDE ⟨so fair an ~ and such stuff within —Shak.⟩ **2** : the material world ⟨can perceive the ~ and the inward, nature's good and God's —Robert Browning⟩

outward-bound \'au̇t-wərd-\ *adj* : bound in an outward direction or to foreign parts ⟨an *outward-bound* ship⟩ — **outward-bound-er** \-də(r)\ *n*

outward-flow turbine \'au̇t-wərd-\ *n* : a water turbine in which the discharge stage of flow is away from the axis

out-ward-ly *adv* [ME, fr. *outward*, adj. + *-ly*] **1 a** : on the outside : EXTERNALLY ⟨~ visible⟩ ⟨~ apparent⟩ **b** : toward the outside : in an outward direction ⟨we see ~ and represent the apparent nature of things —Herbert Read⟩ **2** : in outward state, behavior, or appearance ⟨his ~ more fortunate fellows —Kenneth Fearing⟩ ⟨~ diffident, inwardly dreamy —Jean S. Untermeyer⟩ ⟨~ a placid island —Patrick Smith⟩

out-ward-ness *n* -ES **1** : the quality or state of being outward : EXTERNALITY ⟨the ~ of the world⟩ **2** : concern with or responsiveness to outward things ⟨hearty showmanship and all-around ~ —F.H.Gervasi⟩

outwash \'au̇t-ˌwȯsh\ *n, often attrib* [*out* + *wash* (after *wash out*, v.)] **1 a** : detritus chiefly consisting of gravel and sand carried by running water from the melting ice of a glacier and laid down in stratified deposits : glaciofluvial drift **b** : meltwater from a glacier **2** : soil material washed down a hillside by rainwater and spread upon the more gently sloping adjacent land

outwash cone *or* **outwash fan** *n* : a cone-shaped or fanlike mass of outwash that is ordinarily found at the margin of a dwindling glacier or shrinking ice sheet

outwash plain *also* **outwash apron** *n* : a plain constructed of outwash that is ordinarily found on and beyond the distal side of a terminal or recessional moraine and that generally consists of a number of coalescing outwash fans

outwash train *n* : VALLEY TRAIN

outwatch \(ˌ)au̇t-'wäch\ *vt* [*out-* + *watch*] **1** : to surpass in watching : maintain a longer vigil than ⟨~ his companions⟩ **2** : to maintain a vigil till after the disappearance or end of ⟨~ the moon⟩ ⟨~ the night⟩

outwear \(ˌ)au̇t-'wa(ə)r\ *vt* [*1out* + *wear*] **1** : to wear out or use up : consume or destroy by attrition or use : EXHAUST ⟨drops of water ~ stone⟩ ⟨the machinery has been *outworn*⟩ ⟨the rowers were *outworn*⟩ **2 a** [*out-* + *wear*] : to last longer in use than ⟨a fiber that ~*s* others⟩ **b** : to grow or develop beyond in course of time : OUTLIVE, OUTLIVE ⟨in cases where tradition is notoriously *outworn* —W.C.Brownell⟩ **3** *archaic* : to take up the time of ⟨with sick longing all the night ~ —John Keats⟩

outweep \(ˌ)au̇t-'wēp\ *vt* [*out* + *weep*] **1** *archaic* : to weep out ⟨like a cloud which had *outwept* its rain —P.B.Shelley⟩ **2** [*out-* + *weep*] : to surpass in weeping ⟨can ~ any woman⟩

outweigh \(ˌ)au̇t-'wā\ *vt* [*out-* + *weigh*] : to exceed in weight, value, or importance ⟨an ounce of custom ~*s* a ton of reason —William Hamilton †1856⟩ ⟨no dangers could ~ the advantages of steamboat transportation —*Amer. Guide Series: Ark.*⟩

outwell \(ˌ)au̇t-'wel\ *vb* [*out* + *well*] *vt, obs* : to pour out ~ *vi* : to well out

outwent *past of* OUTGO

1outwick \'au̇t-ˌwik\ *n* [*out* + *wick*] : a shot in curling in which a player's stone is made to hit the outer edge of another stone so as to drive the latter toward the tee — compare INWICK

2outwick \"\ *vi* : to make an outwick

1outwind \'au̇t-ˌwīnd\ *n* [*out* + *wind*] : a wind from the sea

2outwind \(ˌ)au̇t-'wīnd\ *vt* [*out* + *wind*] : to put out of breath ⟨an ~*ed* runner⟩

outwing \(ˌ)au̇t-'wiŋ\ *vt* [*out-* + *wing*] **1** : to outstrip or pass in flying **2** : OUTFLANK

outwinter \(ˌ)au̇t-'wint-ər\ *vb* [*out* + *winter*] *vt* : to keep (cattle) outdoors in winter ⟨the cost of feeding ~*ed* cattle —T.H. Jackson⟩ ~ *vi* : to stay outdoors in winter ⟨the Jersey can ~ provided the climate is not very damp —F.D.Smith & Barbara Wilcox⟩

outwit \(ˌ)au̇t-'wit\ *vt* [*out-* + *wit*] **1** : to defeat or get the better of by superior cleverness or ingenuity : OVERREACH ⟨how best to ~ the youngster and set him to learning when he is not fully aware of it —G.N.Shuster⟩ ⟨three men caught *outwitting* an ~ *Flame*⟩ **2** *archaic* : to surpass in wisdom ⟨outsee seers and ~ sages —R.W.Emerson⟩ **syn** see FRUSTRATE

-with \'au̇t-ˌ\ *prep* [ME, fr. *out* + *with*] **1** *chiefly Scot* : outside of : out of **2** *chiefly Scot* : EXCEPT

-wore *past of* OUTWEAR

outwork \(ˌ)au̇t-'wərk\ *vt* [*out* + *work*] **1** : to work out : COMPLETE ⟨saw, in web unbroken, its history *outwrought* —Thomas Hardy⟩ **2** [*out-* + *work*] *archaic* : to surpass in workmanship **3** [*out-* + *work*] : to outdo in working : work harder or faster than ⟨~*s* his competitors⟩

2outwork \'au̇t-ˌwərk\ *n* [*out* + *work*] **1 a** : an outlying point of defense ⟨had been forced to abandon her ~*s* across the Rhine and the Danube —Richard Koebner⟩ ⟨impairs not only the ~*s* but the citadel of personality —Walter Moberly⟩ **b** : a small defensive position constructed outside a fortified area **2** : work done outside the shop or institution from which it is directed or for which it is performed

outworker \'au̇t-ˌwər-kər\ *n* [*out* + *worker*] : one that works outside the institution or shop by which he is employed

outworld \'au̇t-ˌwərld\ *n* [*out* + *world*] : the outside world

outworn \'au̇t-ˌwȯrn\ *adj* [fr. past part. of *outwear*] **1** : no longer useful or accepted : OUTMODED, OBSOLETE ⟨still attempted to cling to the ~ ethics professed at the dawning of the Gilded Age —J.D.Hart⟩ ⟨an ~ road⟩ **2** : worn out : used up : EXHAUSTED ⟨an ~ champion pugilist —Stanley Walker⟩

outwrestle \(ˌ)au̇t-'re-səl\ *vt* [*out-* + *wrestle*] : to defeat in wrestling : grapple with successfully

outwrite \(ˌ)au̇t-'rīt\ *vt* [*out-* + *write*] **1** : to surpass in ability to write ⟨historian for historian, journalist for journalist, they ~ us —R.H.Rovere⟩ **2** [*1out* + *write*] : to throw off or overcome by writing ⟨*outwrote* his depression⟩

outwrought *past of* OUTWORK

outyell \(ˌ)au̇t-'yel\ *vt* [*out-* + *yell*] : to yell louder than ⟨women quarreling and trying to ~ each other —H.L.Davis⟩

outyield \(ˌ)au̇t-'yēld\ *vt* [*out-* + *yield*] : to surpass in yield ⟨fall-sown or winter oats matured earlier and ~*ed* spring oats —*Experiment Station Record*⟩

ouvaravite *var of* UVAROVITE

ou-vert \(ˌ)ü'ver(ə)r\ *adj* [F, lit., open, fr. OF *overt* — more at OVERT] **1** *ballet* : having an open stance or movement **2** *card games* : OPEN 17b(2)

ou-zel *also* **ou-sel** \'üzəl\ *n* -s [ME *ousel*, *ośel*, fr. OE *ōsle* — more at MERL] **1** : a European blackbird (*Turdus merula*) **2** : any of various thrushes or other birds that are related to the ouzel — see RING OUZEL, WATER OUZEL

ou-zo \'ü(ˌ)zō\ *n* -S [NGk *ouzon*] : a colorless anise-flavored unsweetened Greek liqueur that turns milk-white when mixed with water and ice

ov- *or* **ovi-** *or* **ovo-** *comb form* [L *ov-*, *ovi-*, fr. *ovum* — more at EGG] **1 a** : egg ⟨*ovejector*⟩ ⟨*oviform*⟩ ⟨*ovomucoid*⟩ **b** : ovum ⟨*ovocyte*⟩ ⟨*ovogenesis*⟩ **2** : ovally ⟨*ovo*-elliptic⟩

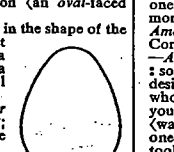
OV *abbr* ovum

OV *abbr* **1** oil of vitriol **2** over voltage

ova *pl of* OVUM

1oval \'ōvəl\ *adj* [ML *ovalis*, fr. LL, of an egg, fr. L *ovum* egg + *-alis* -al] : having the shape of an oval : broadly elliptical ⟨an ~ ball⟩ — often used in combination ⟨an *oval*-faced child⟩ — **oval-ly** \-və(l)lē, -i\ *adv*

2oval \"\ *n* -s **1** : a body or figure generally in the shape of the longitudinal section of an egg **2** : an object of oval or elliptical shape: as **a** : a cartouche of an Egyptian king **b** (1) : a stadium, arena, or athletic field of oval shape (2) : RUNNING TRACK, RACETRACK


oval 1

3oval \"\ *vb* **ovaled** *or* **ovalled**; **ovaled** *or* **ovalled**; **ovaling** \-v(ə)liŋ\ *or* **ovalling**; **ovals** *vi* : to make oval ~ *vt* : to become oval

ov-albumin \(ˌ)ōv+\ *n* [*ov-* + *albumin*] **1** : the principal albumin of white of egg; *esp* : the crystalline part of egg albumins — compare CONALBUMIN **2** : EGG ALBUMIN

ova-le \ō'vālē\ *adj* [NL, specific epithet of *Plasmodium ovale*, fr. ML *ovale*, neut. of *ovalis* oval] : of, relating to, or caused by a malarial parasite (*Plasmodium ovale*)

oval-i-ty \ō'valəd-ē\ *n* -ES [ISV *1oval* + *-ity*] : the quality or state of being oval in shape : degree of departure from true circularity ⟨~ of a worn gun bore⟩

oval-ness \'ōvəlnəs\ *n* -ES : OVALITY

ovalo-cyte \ō'valə,sīt, 'ōvalō,s-\ *n* -S [ISV *1oval* + *-o-* + *-cyte*] : an oval red blood cell normal in the camel and occurring as a rare hereditary anomaly in man — **ovalo-cyt-ic** \ˌō,va-ləˈsid-ik, ˌō,s-\ *adj*

ovalo-cy-to-sis \ˌō,va-ləˌsī-tōsəs, ˌō,s-\ *n, pl* **ovalocyto-ses** \-ˌsēz\ [NL, fr. ISV *ovalocyte* + NL *-osis*] : a hereditary trait in man manifested by the presence in the blood of red blood cells which are oval in shape with rounded ends — compare SICKLE-CELL TRAIT

oval-oid \'ōvəˌlȯid\ *adj* [*2oval* + *-oid*] : approximately oval

oval window *n* [trans. of NL *fenestra ovalis*] : the oval fenestra of the ear

ovari- *or* **ovario-** *also* **ovar-** *comb form* [NL, fr. *ovarium*] **1** : ovary ⟨*ovaritis*⟩ ⟨*ovariectomy*⟩ ⟨*ovariotomy*⟩ **2** : ovarian and ⟨*ovario*-abdominal⟩

ovar-i-al \(ˌ)ō,va(ə)rēəl, -ver-,-vār-\ *adj* [prob. fr. (assumed) NL *ovarialis*, fr. NL *ovari-* + L *-alis* -al] : of, involving, or affecting an ovary ⟨~ function⟩ ⟨~ poisons⟩

ovar-i-an \-ēən\ *adj* [prob. fr. (assumed) NL *ovarianus*, fr. NL *ovari-* + L *-anus* -an] : of or relating to an ovary

ovari-ec-to-mize \(ˌ)ō,va(ə)rē'ektəˌmīz, ˌōvər-\ *vt* -ED/-ING/-S [*ovariectomy* + *-ize*] : to remove an ovary surgically from

ovari-ec-to-my \-mē\ *n* -ES [NL *ovariectomia*, fr. *ovari-* + *-ectomia* -ectomy] : the surgical removal of an ovary

ovar-i-ole \ō'va(ə)rēˌōl\ *n* -S [*ovari-* + *-ole*] : one of the tubes of which the ovaries of most insects are composed

ovar-io-testis \ōˌva(ə)rēō+\ *n* [NL, fr. *ovari-* + L *testis*] : OVOTESTIS

ovar-i-ot-o-my \(ˌ)ō,va(ə)rē'ädəmē\ *n* -ES [NL *ovariotomia*, fr. *ovari-* + *-tomia* -tomy] **1** : surgical incision of an ovary **2** : OVARIECTOMY

ova-ri-tis \ˌōvə'rīdəs\ *n, pl* **ova-rit-i-des** \-rid-ə,dēz\ [NL, fr. *ovari-* + *-itis*] : inflammation of an ovary : OOPHORITIS

ovar-i-um \ō'va(ə)rēəm\ *n, pl* **ovar-ia** \-ēə\ [NL] *archaic* : OVARY

ova-ry \'ōv(ə)rē, -ri\ *n* -ES [NL *ovarium*, fr. L *ovum* egg + *-arium* -ary — more at EGG] **1** : the typically paired essential female reproductive organ that produces eggs and in vertebrates female sex hormones, that occurs in the adult human as an oval flattened body about one inch and one half long suspended from the dorsal surface of the broad ligament of either side, that arises from the Wolffian body, and that consists of a vascular fibrous stroma enclosing developing egg cells which in their later stages with nutricial structures constitute Graafian follicles **2** : the enlarged rounded usu. basal portion of the pistil or gynoecium of an angiospermous plant that bears the ovules and consists of a single carpel or of several united carpels — see FLOWER illustration

1ovate \'ō,vāt, ō'vāt\ *n* -S [modif. of Gk *ouatelς*, pl., members of one of three classes of Gaulish bards, prob. of Celt origin; akin to OIr *fāith* seer, poet — more at VATIC] : one of a class of bards in Wales graduated in bardic lore and approved by a session of bards

2ovate \'ō,vāt, -ād-\ *adj* [L *ovatus*, fr. *ovum* egg + *-atus* -ate] **1** : shaped like an egg : OVAL — often used in combination ⟨*ovate*-oblong⟩ ⟨*ovate*-deltoid⟩ **2** : having an outline like that of the longitudinal section of an egg with the basal end broader ⟨~ leaves⟩ — see LEAF illustration

1ova-tion \ō'vāshən\ *n* -S [L *ovation-*, *ovatio*, fr. *ovatus* (past part. of *ovare* to exult, rejoice) + *-ion-*, *-tio* -ion; akin to Gk *euazein* to shout for joy, *euoi*, interjection used in Dionysiac celebrations] **1** : a ceremony attending the entering of Rome by a general who had won a victory of less importance than that for which a triumph was granted **2** *archaic* : EXULTATION **3** : enthusiastic popular homage or a public expression of it : an enthusiastic popular reception or tribute ⟨received an ~ as he entered the hall⟩

2ovation \"\ *vi* -ED/-ING/-S : to give an ovation ⟨will all be there . . . to ~ you —Barnaby Conrad⟩

ovc *abbr* ovoid

ov-ejec-tor \'ōvə,jektə(r), -vē,j-\ *n* -S [ISV *ov-* + *ejector*, trig. formed as F *ovéjecteur*] : the terminal highly mus... part of the oviduct of many nematode worms that forces the egg through the genital pore — **ovejectoral** *adj*

ov-en \'əvən *sometimes* 'əv²m *or* 'əb²m\ *n* -S [ME, fr. OE *ofen*; akin to OHG *ofan* oven, ON *ofn*, Goth *auhns* oven, L *aulla* pot, Gk *ipnos* oven, Skt *ukha* cooking pot] **1** *obs* : FURNACE **2 a** : a chamber of brick or stonework used for baking, heating, or drying **b** : a heated enclosure of varying construction used for such purposes: as (1) : a chamber in a stove used for baking or roasting (2) : a laboratory hot-air sterilizer

ovenbird \'ə-vən,ərd\ *n* [*oven* + *bird*; fr. the shape of their nests] **1** : any of various So. American passerine birds of the genus *Furnarius* **2** : an American wood warbler (*Seiurus aurocapillus*) having olivaceous upper parts with a yellowish brown black-bordered crown, white underparts streaked with black and building a dome-shaped nest placed on the ground

oven dressed *adj* : ready for cooking : FULL-DRESSED ⟨*oven dressed* poultry⟩

ovendry \'ə-vən,drī\ *adj* [*oven* + *dry*, adj.] : dried at a temperature at or above that of boiling water (usu. 100 to 110°C or 212 to 230°F)

oven-dry \ˌə-vən-'drī\ *vt* [*oven* + *dry*, v.] : to dry in an oven

ovenman \'ə-vən,man\ *n, pl* **ovenmen** **1** : a baker who tends an oven **2** : a worker who bakes parts or products in an oven to harden and strengthen them or to harden their finish

ovenware \'ə-vən,wa(ə)r\ *n* : dishes used for baking and serving food

oven wood *n* : BRUSHWOOD

1over \'ōv(ə)r\ *adv* [ME, adv. & prep., fr. OE *ofer*; akin to OHG *ubari*, *ubiri*, adv., over, *ubar*, prep., over, ON *yfir*, adv. & prep., Goth *ufar*, prep., over, L *super*, adv. & prep., over, Gk *hyper*, adv. & prep., Skt *upari*, adv. & prep., over, OE *ufan* above] **1 a** (1) : from one point to another across an intervening space or barrier ⟨sail ~ to England⟩ ⟨throw the ball ~⟩ ⟨galloped ~ to the scene —H.E.Scudder⟩ ⟨the major called the three ~ —C. G. De Van⟩ (2) : so as to pass down or forward and down ⟨went too near the edge and fell ~⟩ (3) : from inside to outside across the brim ⟨the soup boiled ~⟩ (4) : so as to bring the underside to or toward the top ⟨turned himself ~⟩ ⟨roll a stone ~⟩ ⟨turn the page ~⟩ (5) : in the opposite direction ⟨gave the order to put the helm ~ —A. A. & Mary Hoehling⟩ (6) : over the side of a ship ⟨put a boat ~ to come and look for you —R.F.Mirvish⟩ ⟨put the ladder ~ — Vincent McHugh⟩ (7) : from side to side : in diameter : ACROSS ⟨the mouth of the cave was about 12 feet ~⟩ (8) : so as to pass over a target and beyond ⟨the bullets fell short or went ~⟩ (9) : away from a vertical to a prone or inclined position ⟨knocked the boy ~⟩ ⟨the wall fell ~⟩ ⟨the ship heeled ~⟩ (10) : to one's home ⟨inviting fifteen or twenty of her friends ~ for fun and games —*N.Y. Times*⟩ **b** (1) : on the other side of an intervening space ⟨is ~ in England⟩ (2) : at some distance from a particular point : AWAY ⟨a fellow a couple of counties ~ —Brad Sebstad⟩ ⟨from two blocks ~ he could hear the thin wail —H.M.Brier⟩ ⟨the bomb hit the next pier ~ —R.O.Bowen⟩ **c** (1) : so as to pass or transfer from one person, side, activity, or opinion to another ⟨hand ~ the money⟩ ⟨theater orchestras . . . had gone ~ completely to it — *Amer. Guide Series: Wash.*⟩ ⟨endorsed it ~ to the . . . Housing Corporation —Warner Olivier⟩ ⟨turned it ~ to her daughter —*Amer. Guide Series: Ark.*⟩ ⟨went ~ to the opposition⟩ (2) : so as to achieve understanding, acceptance, support, or other desired effect — usu. used with *get* ⟨are not getting ~ to those whom we are addressing —A.T.Weaver⟩ ⟨get your effect and your meaning ~ to the orchestra —Warwick Braithwaite⟩ ⟨wants to get his own message ~ —W.F.Hamby⟩ (3) : into one's own possession : so as to be in control ⟨the university took it ~ —*Amer. Guide Series: Md.*⟩ ⟨took ~ after a revolt⟩ ⟨took ~ from a firm that had gone into liquidation —*Irish Digest*⟩ — compare TAKE OVER **d** : ASIDE ⟨throwing ~ traditional morality⟩ **2 a** : beyond, above, or in excess of some quantity or limit ⟨boys of twelve and ~⟩ **b** (1) : in or to excess : beyond the norm ⟨she was ~ canvassed —Peter Heaton⟩ ⟨they were seven minutes ~ —Goodman Ace⟩ (2) : IN-ORDINATELY, EXCESSIVELY — often used in combination ⟨on his guard against *over*quick deductions —A.E.Duncan-Jones⟩ ⟨just naturally *over*registers emotion —*Current Blog.*⟩ ⟨*over*-conservative traditionalists —John Arlott⟩ **c** : till a later time ⟨leave this new inquiry ~ till Monday —F.W.Crofts⟩ ⟨so glad you can stay ~⟩ **3 a** : ABOVE ⟨the plane was directly ~⟩ **b** : so as to cover, conceal, or affect the whole surface or expanse ⟨the original logs were boarded ~ —*Amer. Guide Series: Ark.*⟩ **4 a** : at an end — often used in the phrase *over with* ⟨hurrying to get the business ~ with⟩ **b** — used on a two-way radio circuit to indicate that a particular sentence or message is complete and that a reply is expected ⟨~ and let me know what you think⟩ (2) : in an intensive or comprehensive manner : THOROUGHLY ⟨the issue is worked ~ in the most . . . compelling scene of the play —Leslie Rees⟩ ⟨talk the matter ~⟩ **b** (1) : for a second or successive time : once more : AGAIN ⟨this work will have to be done ~⟩ ⟨read the difficult passage twice ~⟩ — often used in the phrase *over again* ⟨asked to recite the verse ~ again⟩ (2) : so as to be transformed or changed from a previous state or condition ⟨a man cannot make himself ~⟩

2over \"\ *prep* [ME, adv. & prep., fr. OE *ofer* — more at 1OVER] **1 a** (1) — used as a function word to indicate position higher up than and usu. directly above another object ⟨~ the elm tops in the west —Lucien Price⟩ ⟨towered ~ his diminutive mother⟩ ⟨leaned ~ the rampart⟩ (2) — used as a function word to indicate a surrounding condition or threatening prospect ⟨an atmosphere of doubt and uncertainty hung ~ the town⟩ (3) — used as a function word to indicate that the author's name is subscribed to a writing ⟨sent a letter to the paper ~ his own signature⟩ (4) : above the mental capacity or beyond the comprehension of — usu. used in the phrase *over the head of* ⟨his lecture was way ~ the heads of his audience⟩ **b** (1) — used as a function word to indicate submersion above a specified level ⟨~ his waist in water⟩ (2) — used as a function word to indicate extreme or acute embarrassment or difficulty of a specified kind ⟨~ head and ears in debt⟩ **2 a** — used as a function word to indicate the possession or enjoyment of authority, power, or jurisdiction in regard to some thing or person ⟨installed as minister ~ one of the largest congregations in the city⟩ ⟨unfailing in their service of those ~ them —E.R.Hughes⟩ **b** — used as a function word to indicate a relation of superiority, advantage, or preference to another ⟨the relative importance of the abstract ~ the pictorial —C.J. Bulliet⟩ ⟨taking an unprecedented lead ~ the other teams — *Current Blog.*⟩ ⟨this excess of wealth ~ population —W.P. Webb⟩; often used in the phrase *have it over* or *have it all over* ⟨the Britisher in America has it ~ the anthropologist —V.O. Key⟩ **c** — used as a function word to indicate suppression of or release from a passion, infatuation, or other strong feeling ⟨finally got ~ his mad⟩ ⟨never got ~ his love for the baroque —*Current Blog.*⟩ **d** — used as a function word to indicate someone or something that is overcome, circumvented, or disregarded in achieving an objective ⟨we got ~ him —Adrian Bell⟩ ⟨passed ~ the president's veto —*Current Blog.*⟩ **3 a** *archaic* : further than : BESIDES **b** : more than ⟨cost ~ five dollars⟩ **4 a** (1) : upon or down upon so as to rest, cover, or conceal from view ⟨~ which they throw a bridge of flowers — *Amer. Guide Series: La.*⟩ ⟨laid a blanket ~ the sleeping child⟩ ⟨a cap pulled low ~ his eyes⟩ ⟨got some blood ~ your face — Burt Arthur⟩ (2) : upon or down upon so as to change or otherwise influence in a pervasive manner ⟨don't know what has come ~ the girl⟩ (3) : ON, UPON ⟨bop people ~ the head —Bennett Cerf⟩ ⟨rap a child ~ the knuckles⟩ (4) — used as a function word to indicate change, variation, or difference from some other thing or period ⟨this year's copy contains no innovations ~ those in the past —*Springfield (Mass.) Daily News*⟩ ⟨a drop of three ~ 1956 —*Springfield (Mass.) Daily News*⟩ **b** (1) : at or to all the parts of the surface of : throughout a specified area ⟨the common toad is found ~ the entire state —*Amer. Guide Series: Minn.*⟩ ⟨packing and shipping concerns who sell the U.S. ~ —*Spokane (Wash.) Spokesman-Rev.*⟩ — often used with intensive *all* ⟨the rumor is all ~ Washington —*New Republic*⟩ ⟨votive chapels sprang up in his honor

EXHIBIT B
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

IES LIGHTING HANDBOOK

1984 Reference Volume

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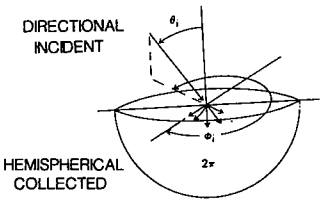

directional lighting: lighting provided on the work-plane or on an object predominantly from a preferred direction. See *accent lighting, key light, cross light.*

disability glare: glare resulting in reduced visual performance and visibility. It often is accompanied by discomfort. See *veiling luminance.*

disability glare factor (DGF): a measure of the visibility of a task in a given lighting installation in comparison with its visibility under reference lighting conditions, expressed in terms of the ratio of luminance contrasts having an equivalent effect upon task visibility. The value of DGF takes account of the equivalent veiling luminance produced in the eye by the pattern of luminances in the task surround.

discomfort glare: glare producing discomfort. It does not necessarily interfere with visual performance or visibility.

discomfort glare factor: the numerical assessment of the capacity of a single source of brightness, such as a luminaire, in a given visual environment for producing discomfort. (This term is obsolete and is retained for reference and literature searches.) See *glare* and *discomfort glare.*

discomfort glare rating (DGR): a numerical assessment of the capacity of a number of sources of luminance, such as luminaires, in a given visual environment for producing discomfort. It is the net effect of the individual values of index of sensation for all luminous areas in the field of view. See *discomfort glare factor.*

distal stimuli: in the physical space in front of the eye one can identify points, lines and surfaces and three dimensional arrays of scattering particles which constitute the distal physical stimuli which form optical images on the retina. Each element of a surface or volume to which an eye is exposed subtends a solid angle at the entrance pupil. Such elements of solid angle make up the field of view and each has a specifiable luminance and chromaticity. Points and lines are specific cases which have to be dealt with in terms of total candlepower and candlepower per unit length.

distribution temperature (of a light source): the absolute temperature of a blackbody whose relative spectral distribution is the same (or nearly so) in the visible region of the spectrum as that of the light source.

dominant wavelength (of a light), λ_d: the wavelength of radiant energy of a single frequency that, when combined in suitable proportion with the radiant energy of a reference standard, matches the color of the light. See *complementary wavelength.*

downlight: a small direct lighting unit which directs the light downward and can be recessed, surface mounted or suspended.

downward component: that portion of the luminous flux from a luminaire emitted at angles below the horizontal. See *upward component.*

driving beam: See *upper beam.*

dual headlighting system: headlighting by means of two double units, one mounted on each side of the front end of a vehicle. Each unit consists of two lamps mounted in a single housing. The upper or outer lamps may have two filaments supplying the lower beam and part of the upper beam, respectively. The lower or inner lamps have one filament providing the primary source of light for the upper beam.

dust-proof luminaire: a luminaire so constructed or protected that dust will not interfere with its successful operation.

dust-tight luminaire: a luminaire so constructed that dust will not enter the enclosing case.

E

effective ceiling cavity reflectance, ρ_{cc}: a number giving the combined reflectance effect of the walls and ceiling of the ceiling cavity. See *ceiling cavity ratio.*

effective floor cavity reflectance, ρ_{fc}: a number giving the combined reflectance effect of the walls and floor of the floor cavity. See *floor cavity ratio.*

efficacy: See *luminous efficacy of a source of light* and *spectral luminous efficacy of radiant flux.*

efficiency: See *luminaire efficiency, luminous efficacy of a source of light* and *spectral luminous efficiency of radiant flux.*

electric discharge: See *arc discharge, gaseous discharge and glow discharge.*

electric-discharge lamp: a lamp in which light (or radiant energy near the visible spectrum) is produced by the passage of an electric current through a vapor or a gas. See *fluorescent lamp, cold-cathode lamp, hot-cathode lamp, carbon-arc lamp, glow lamp, fluorescent lamp, high intensity discharge lamp.*

NOTE: Electric-discharge lamps may be named after the filling gas or vapor that is responsible for the major portion of the radiation; *e.g.* mercury lamps, sodium lamps, neon lamps, argon lamps, etc.

A second method of designating electric-discharge lamps is by psysical dimensions or operating parameters; *e.g.* short-arc lamps, high-pressure lamps, low-pressure lamps, etc.

A third method of designating electric-discharge lamps is by their application; in addition to lamps for illumination there are photochemical lamps, bactericidal lamps, blacklight lamps, sun lamps, etc.

electroluminescence: the emission of light from a phosphor excited by an electromagnetic field.

electromagnetic spectrum: a continuum of electric and magnetic radiation encompassing all wavelengths. See *regions of electromagnetic spectrum.*

Examples of these applications are industrial heating, drying, baking and photoreproduction. However, some applications, such as infrared viewing devices, involve detectors sensitive to a restricted range of wavelengths; in such cases the spectral characteristics of the source and receiver are of importance.

initial luminous exitance: the density of luminous flux leaving a surface within an enclosure before interreflections occur.

NOTE: For light sources this is the luminous exitance as defined in *luminous flux density at a surface*. For non-self-luminous surfaces it is the reflected luminous exitance of the flux received directly from sources within the enclosure or from daylight.

instant start fluorescent lamp: a fluorescent lamp designed for starting by a high voltage without preheating of the electrodes.

NOTE: Also known as a cold-start lamp in some countries.

integrating photometer: a photometer that enables total luminous flux to be determined by a single measurement. The usual type is the Ulbricht sphere with associated photometric equipment for measuring the indirect luminance of the inner surface of the sphere. (The measuring device is shielded from the source under measurement.)

intensity: a shortening of the terms *luminous intensity* and *radiant intensity*. Often misused for level of illumination or illuminance.

interflectance: an alternate term for *room utilization factor*.

interflectance method: a lighting design procedure for predetermining the luminances of walls, ceiling and floor and the average illuminance on the work-plane based on integral equations. It takes into account both direct and reflected flux.

interflected component: the portion of the luminous flux from a luminaire arriving at the work-plane after being reflected one or more times from room surfaces, as determined by the *flux transfer theory*.

interflection: the multiple reflection of light by the various room surfaces before it reaches the work-plane or other specified surface of a room.

inter-reflectance: the portion of the luminous flux (lumens) reaching the work-plane that has been reflected one or more times as determined by the flux transfer theory. See Section 9.

interrupted quick-flashing light: a quick flashing light in which the rapid alternations are interrupted by periods of darkness at regular intervals.

inverse-square law: the law stating that the illuminance E at a point on a surface varies directly with the intensity I of a point source, and inversely as the square of the distance d between the source and the point. If the surface at the point is normal to the direction of the incident light, the law is expressed by $E = I/d^2$.

NOTE: For sources of finite size having uniform luminance, this gives results that are accurate within one percent when d is at least five times the maximum dimension of the source as viewed from the point on the surface. Even though practical interior luminaires do not have uniform luminance, this distance, d, is frequently used as the minimum for photometry of such luminaires, when the magnitude of the measurement error is not critical.

iris: an assembly of flat metal leaves arranged to provide an easily adjustable near-circular opening, placed near the focal point of the beam (as in an ellipsoidal reflector spotlight), or in front of the lens to act as a mechanical dimmer as in older types of carbon arc follow spotlights.

irradiance, E: the density of radiant flux incident on a surface.

isocandela line: a line plotted on any appropriate set of coordinates to show directions in space, about a source of light, in which the intensity is the same. A series of such curves, usually for equal increments of intensity, is called an isocandela diagram.

isolux (isofootcandle) line: a line plotted on any appropriate set of coordinates to show all the points on a surface where the illuminance is the same. A series of such lines for various illuminance values is called an isolux (isofootcandle) diagram.

K

key light: the apparent principal source of directional illumination falling upon a subject or area.

kicker: a luminaire used to provide an additional highlight or accent on a subject.

klieg light: a high intensity carbon arc spotlight, typically used in motion picture lighting.

L

laboratory reference standards: the highest ranking order of standards at each laboratory.

lambert, L: a lambertian unit of luminance equal to $1/\pi$ candela per square centimeter. The use of this unit is deprecated.

lambertian surface: a surface that emits or reflects light in accordance with Lambert's cosine law. A lambertian surface has the same luminance regardless of viewing angle.

Lambert's cosine law, $I_\theta = I_0 \cos\theta$: the law stating that the luminous intensity in any direction from an element of a perfectly diffusing surface varies as the cosine of the angle between that direction and the perpendicular to the surface element.

lamp: a generic term for a man-made source of light. By extension, the term is also used to denote sources that radiate in regions of the spectrum adjacent to the visible.

NOTE: A lighting unit consisting of a lamp with shade, reflector, enclosing globe, housing, or other accessories is also called a "lamp." In such cases, in order to distinguish between the assembled unit and the light source within it, the latter is often called a "bulb" or "tube," if it is electrically powered. See also *luminaire*.

lamp burnout factor: the fractional loss of task illuminance due to burned out lamps left in place for long periods.

lamp lumen depreciation factor, LLD: the multiplier to be used in illumination calculations to

directly on the ceiling.

suspended (pendant) luminaire: a luminaire hung from a ceiling by supports.

switch start fluorescent lamps: see *preheat fluorescent lamp.*

T

table lamp: a portable luminaire with a short stand suitable for standing on furniture.

tail lamp: a lamp used to designate the rear of a vehicle by a warning light.

talbot, T.: a unit of light; equal to one lumen-second.

tanning lamp: an ultraviolet lamp that radiates a significant portion of its radiative power in the UV-A and/or B band.

task lighting: lighting directed to a specific surface or area that provides illumination for visual tasks.

task-ambient lighting: a combination of task lighting and ambient lighting within an area such that the general level of ambient lighting is lower than and complementary to the task lighting.

taxi-channel lights: aeronautical ground lights arranged along a taxi-channel of a water aerodrome to indicate the route to be followed by taxiing aircraft.

taxi light: an aircraft aeronautical light designed to provide necessary illumination for taxiing.

taxiway lights: aeronautical ground lights provided to indicate the route to be followed by taxiing aircraft. See *taxiway-centerline lights, taxiway-edge lights, taxiway holding-post light.*

taxiway-centerline lights: taxiway lights placed along the centerline of a taxiway except that on curves or corners having fillets, these lights are placed a distance equal to half the normal width of the taxiway from the outside edge of the curve or corner.

taxiway-edge lights: taxiway lights placed along or near the edges of a taxiway.

taxiway holding-post light: a light or group of lights installed at the edge of a taxiway near an entrance to a runway, or to another taxiway, to indicate the position at which the aircraft should stop and obtain clearance to proceed.

temperature radiator: a radiator whose radiant flux density (radiant exitance) is determined by its temperature and the material and character of its surface, and is independent of its previous history. See *blackbody* and *graybody.*

thermopile: a thermal radiation detector consisting of a number of thermocouples interconnected in order to increase the sensitivity to incident radiant flux.

threshold: the value of a variable of a physical stimulus (such as size, luminance, contrast or time) that permits the stimulus to be seen a specific percentage of the time or at a specific accuracy level. In many psychophysical experiments, thresholds are presented in terms of 50 per cent accuracy or accurately 50 per cent of the time. However, the threshold also is expressed as the value of the physical variable that permits the object to be just barely seen. The threshold may be determined by merely detecting the presence of an object or it may be determined by discriminating certain details of the object. See *absolute luminance threshold, brightness contrast threshold, luminance threshold, modulation size threshold.*

threshold lights: runway lights placed to indicate the longitudinal limits of that portion of a runway, channel or landing path usable for landing.

top light: illumination of a subject directly from above employed to outline the upper margin or edge of the subject.

torchere: an indirect floor lamp sending all or nearly all of its light upward.

tormentor light: luminaire mounted directly behind the sides of the stage arch.

total emissivity: See *spectral-total directional emissivity* and *spectral-total hemispherical emissivity.*

touchdown zone lights: barettes of runway lights installed in the surface of the runway between the runway edge lights and the runway centerline lights to provide additional guidance during the touchdown phase of a landing in conditions of very poor visibility.

traffic beam: See *lower (passing) beams.*

train: the angle between the vertical plane through the axis of the searchlight drum and the plane in which this plane lies when the search light is in a position designated as having zero train.

transient adaptation factor, TAF: a factor which reduces the *equivalent contrast* due to readaptation from one luminous background to another.

transmission: a general term for the process by which incident flux leaves a surface or medium on a side other than the incident side, without change in frequency.

NOTE: Transmission through a medium is often a combination of regular and diffuse transmission. See *regular transmission, diffuse transmission,* and *transmittance.*

transmissometer: a photometer for measuring transmittance.

NOTE: Transmissometers may be visual or physical instruments.

transmittance, $\tau = \Phi_t/\Phi_i$: the ratio of the transmitted flux to the incident flux.

NOTE: Measured values of transmittance depend upon the angle of incidence, the method of measurement of the transmitted flux, and the spectral character of the incident flux. Because of this dependence complete information on the technique and conditions of measurement should be specified.

It should be noted that transmittance refers to the ratio of flux emerging to flux incident; therefore, reflections at the surface as well as absorption within the material operate to reduce the transmittance.

tristimulus values of a light, *X*, *Y*, *Z*: the amounts of each of three primaries required to match the color of the light.

troffer: a recessed lighting unit, usually long and installed with the opening flush with the ceiling. The term is derived from "trough" and "coffer."

troland: a unit of retinal illuminance which is based upon the fact that retinal illuminance is proportional to the product of the luminance of the distal stimulus and the area of entrance pupil. One troland is the retinal illuminance produced when the luminance of the distal stimulus is one candela per square meter and the area of the pupil is one square millimeter.

NOTE: The troland makes no allowance for interocular attenuation or for the *Stiles-Crawford effect.*

tube: See *lamp.*

tungsten-halogen lamp: a gas filled tungsten incandescent lamp containing a certain proportion of halogens in an inert gas whose pressure exceeds three atmospheres.

NOTE: The tungsten-iodine lamp (UK) and quartz-iodine lamp (USA) belong to this category.

turn signal operating unit: that part of a signal system by which the operator of a vehicle indicates the direction a turn will be made, usually by a flashing light.

U

ultraviolet lamp: a lamp which radiates a significant portion of its radiative power in the ultraviolet (UV) part of the spectrum; the visible radiation is not of principal interest.

ultraviolet radiation: for practical purposes any radiant energy within the wavelength range 10 to 380 nanometers. See *regions of electromagnetic spectrum.*

NOTE: On the basis of practical applications and the effect obtained, the ultraviolet region often is divided into the following bands:

Ozone-producing	180–220 nanometers
Bactericidal (germicidal)	220–300 nanometers
Erythemal	280–320 nanometers
"Black light"	320–400 nanometers

There are no sharp demarcations between these bands, the indicated effects usually being produced to a lesser extent by longer and shorter wavelengths. For engineering purposes, the "black light" region extends slightly into the visible portion of the spectrum. Another division of the ultraviolet spectrum often used by photobiologists is given by the CIE:

UV-A	315-400 nanometers
UV-B	280-315 nanometers
UV-C	100–280 nanometers

units of luminance: the luminance of a surface in a specified direction may be expressed in luminous intensity per unit of projected area of surface or in luminous flux per unit of solid angle and per unit of projected surface area.

NOTE: Typical units are the candela per square meter (lumen per steradian and per square meter) and the candela per square foot (lumen per steradian and per square foot).

The luminance of a surface in a specified direction is also expressed (incorrectly) in lambertian units as the number of lumens per unit area that would leave the surface *if the luminance in all directions within the hemisphere on the side of the surface being considered were the same as the luminance in the specified direction.*

NOTE: A typical unit in this system is the footlambert, equal to one lumen per square foot.

This method of specifying luminance is equivalent to stating the number of lumens that would leave the surface *if the surface were replaced by a perfectly diffusing surface with a luminance in all directions within the hemisphere equal to the luminance of the actual surface in the direction specified.* In practice no surface follows exactly the cosine formula of emission or reflection; hence the luminance is not uniform but varies with the angle from which it is viewed. For this reason, this practice is denigrated.

unrecoverable light loss factors: factors which give the fractional light loss that cannot be recovered by cleaning or lamp replacement.

upper (driving) beams: one or more beams intended for distant illumination and for use on the open highway when not meeting other vehicles. Formerly "country beam." See *lower (passing) beams.*

upward component: that portion of the luminous flux from a luminaire emitted at angles above the horizontal. See *downward component.*

utilance: See *room utilization factor.*

V

vacuum lamp: an incandescent lamp in which the filament operates in an evacuated bulb.

valance: a longitudinal shielding member mounted across the top of a window or along a wall and usually parallel to the wall, to conceal light sources giving both upward and downward distributions.

valance lighting: lighting comprising light sources shielded by a panel parallel to the wall at the top of a window.

values of spectral luminous efficiency for photopic vision, $V(\lambda)$: values for spectral luminous efficiency at 10-nanometer intervals (see Fig. 1–6) were provisionally adopted by the CIE in 1924 and were adopted in 1933 by the International Committee on Weights and Measures as a basis for the establishment of photometric standards of types of sources differing from the primary standard in spectral distribution of radiant flux. These values are given in the second column of Fig. 1–6; the intermediate values given in the other columns have been interpolated.

NOTE: These standard values of spectral luminous efficiency were determined by observations with a two-degree photometric field having a moderately high luminance, and photometric evaluations based upon them consequently do not apply exactly to other conditions of observation. Power in watts weighted in accord with these standard values are often referred to as *lightwatts.*

values of spectral luminous efficiency for scotopic vision $V'(\lambda)$: values of spectral luminous efficiency at 10-nanometer intervals (see Fig. 1–5) were provisionally adopted by the CIE in 1951.

EXHIBIT C
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

NEERING SOCIETY

for all matters concerning illumination. hat any trustee of knowledge must do wledge to the public for its welfare and

pecifically of the engineering aspects of ized about this professional viewpoint. emphasis that lighting's major goal is to Thus, the task of providing the external an appreciation and understanding of lated considerations. This is reflected in tion and the resultant broad scope of

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Herbert A. Ande
James R. Bale
Taylor M. Barr
Benjamin S. Ben
Edward I. Creed
H. E. D'Andrade
Joseph P. Ditchn
Ralph E. Farnha
Dr. Gorton R. F
Paul H. Goodell
James D. Hall
Alvin L. Hart
John P. Hoxie
Dr. Deane B. Juc

The preparation of t
and stimulation of thi
Society:

Marshall N. Wat

Editing and coordina
were carried out by Jc
Technical Director. T
policy and plans for ope

Interflectance: the ratio of the lumens received on the work plane to the lumens emitted by the luminaires.

Room ratio: a number indicating room proportions, calculated from length, width, and ceiling height.

Room index: a letter representing a range of room ratios.

Mounting height: the distance from the floor to the light center of the luminaire.

Spacing-to-mounting-height ratio: ratio of the distance between luminaires to the mounting height.

Maintenance factor: the ratio of the illumination on a given area after a period of time to the initial illumination on the same area. The initial illumination may be at a point or averaged over an area, but the final illumination must be evaluated in the same manner. The time at which the final value is measured must be representative of the conditions desired, i.e., at the time when the illumination has depreciated to a *minimum* or to an *average* value characteristic of the cleaning, servicing, and re-lamping schedule. The conditions should be specified by referring to "M.F. min." or "M.F. avg." The usual meaning is taken to be the minimum maintenance factor.

Troffer: a long recessed lighting unit usually installed with the opening flush with the ceiling; derived from "trough" and "coffer."

Louverall ceiling: a general lighting system comprising a wall-to-wall installation of multi-cell louvers shielding the light sources mounted above it.

Luminous ceiling: a lighting system comprising a continuous surface of diffusing material with light sources mounted above it.

Cove lighting: a system comprising light sources shielded by a ledge or horizontal recess, and distributing light over the ceiling and upper wall.

Cornice lighting: a system comprising light sources shielded by a panel parallel to the wall and attached to the ceiling, and distributing light over the wall.

Valance lighting: a system comprising light sources shielded by a panel parallel to the wall at the top of a window.

Directional lighting: lighting designed to illuminate the work plane, or an object, predominantly from a preferred direction.

Accent lighting: directional lighting to emphasize a particular object.

Mat surface: a surface from which the reflection is predominantly diffuse, with or without a negligible specular component.

Aviation Lighting Terms

Aeronautical light: any luminous sign or signal, recognized by competent authority, which is established, maintained, exhibited or operated as an aid to air navigation.

Aeronautical beacon: a light specifically provided as an aid to air navigation, visible at a
used to designate a par
Fixed light: a ligh
served from a fixed poi
Flashing light: a li
with dark periods.
Occulting light: a
longer duration than tl
Undulating light:
crease in luminous int
Linear light: a lur
Conspicuity: the c
background so as to be
Visibility: the abil
expressed in units of c
objects by day and pro
Night: the hours b
beginning of morning
when the center of th
begins in the morning
low the horizon.)

Daylighting Terms

Altitude: the angu
great circle which pa
through the body and
the horizon to the zen
Azimuth: the angu
a given line or a celest
Sun bearing: the
through which a verti
be rotated to contain
Light, sun: direct
—, sky: visible r
—, ground: visil
faces below the plane
Sky, clear: less th
—, partly cloudy:
—, cloudy: more
—, overcast: 100
Solar time: time
taken as the instant i
meridian. (This is th
Clerestory: that
other parts, and whos
Fenestration: any
filled with media for c

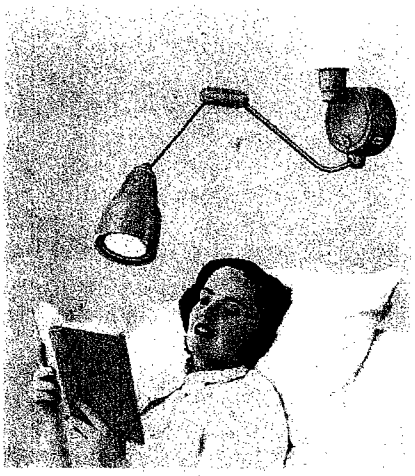


Fig. 12-18. Wall mounted adjustable light for reading and general illumination.

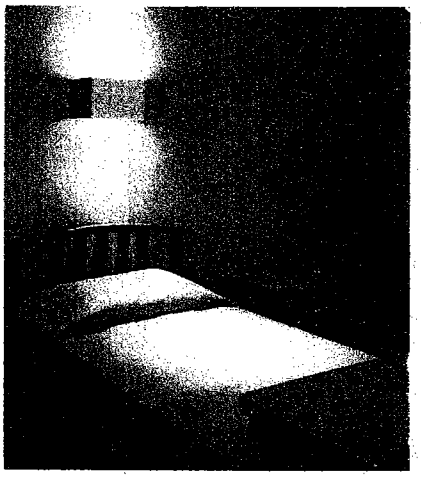
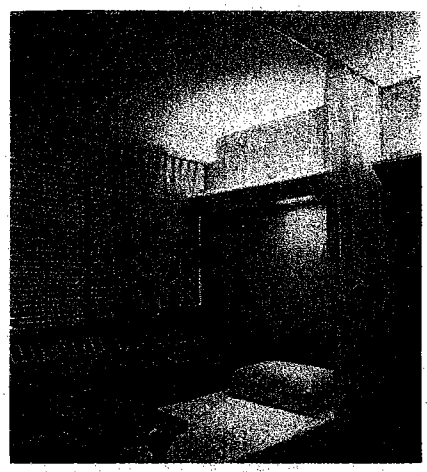


Fig. 12-19. Wall mounted non-adjustable light for reading and general illumination.



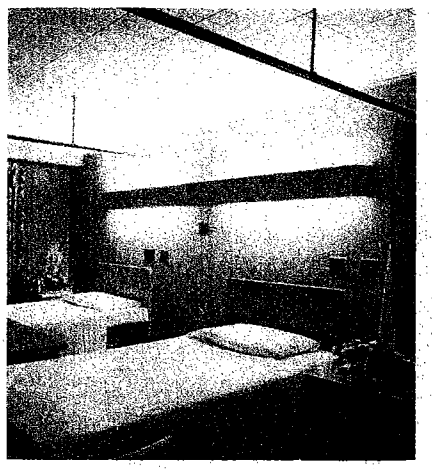
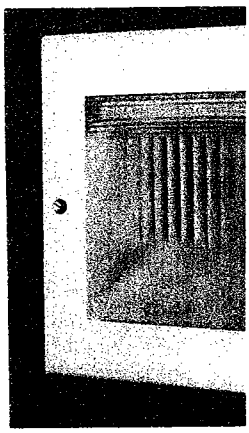


Fig. 12-20. Wall mounted non-adjustable light for reading and general illumination; left, for single-bed unit; and right, for two-bed unit.

porated into the patients' reading light. See Fig. 12-17. However, if such combination units are of the plug-in types, the receptacle should be switched at the door unless other suitable lighting is controllable at the door.

An examining light that will produce approximately 100 footcandles over a limited area should be provided. A fixed ceiling mounted examining lighting unit arranged to light the entire bed area might be un-



comfortably glaring
than required for t
preferred by the ex
providing an exam
light, fixed or adju
floor-stand or hand
depend upon the p

Nurses' station. needed for charting is needed at the m reading notation, instrument graduat

Autopsy rooms. lar to that for emer

X-ray and cobo therapy suites gene where records are ment rooms, which general illuminatio candles should be The viewing room operating rooms, t locations. (See Fig

Fluoroscopy ro to provide 10 footc a separate system foot switch conver adapted.

Dental suites.

Dental operator

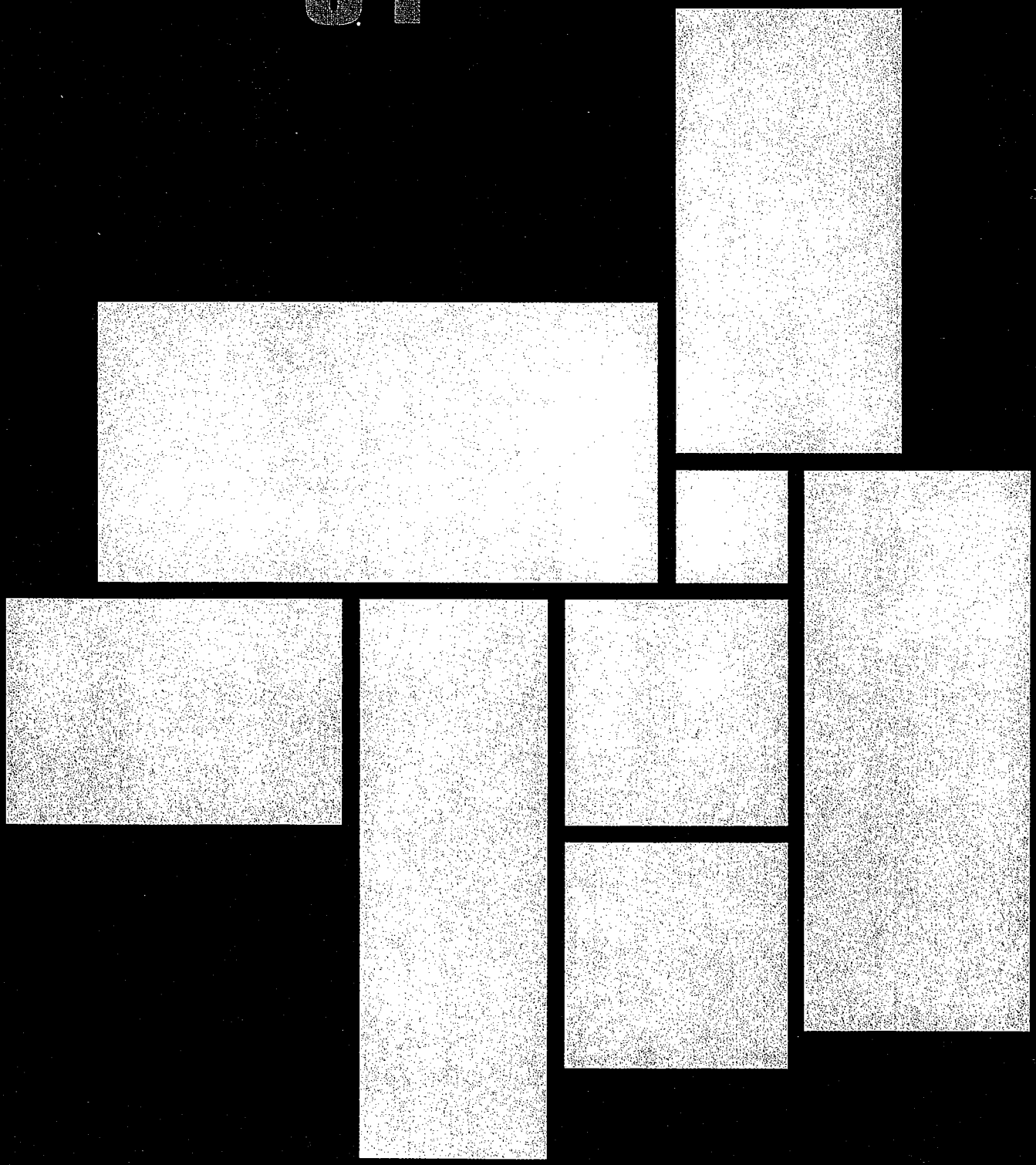
EXHIBIT D
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

9.1/Co

Conwed

ceiling products

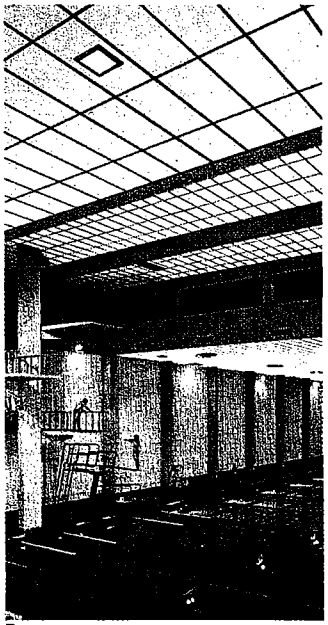
9 ACOUSTICAL TREATMENT



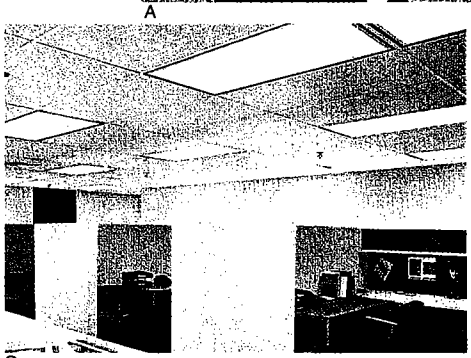
About the cover . . .

On the cover and throughout the brochure is a design which graphically represents the variety of sizes available in the Conwed ceiling products family.

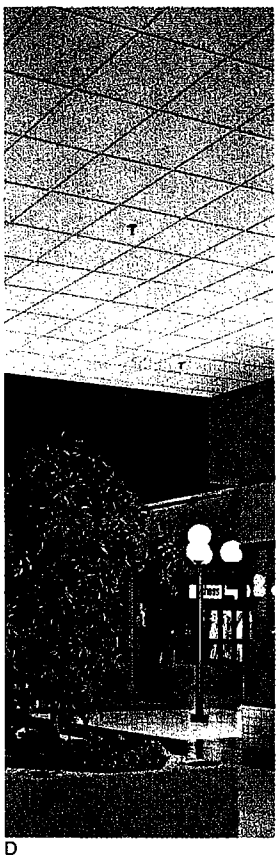
A



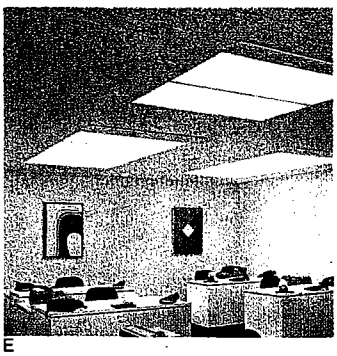
B



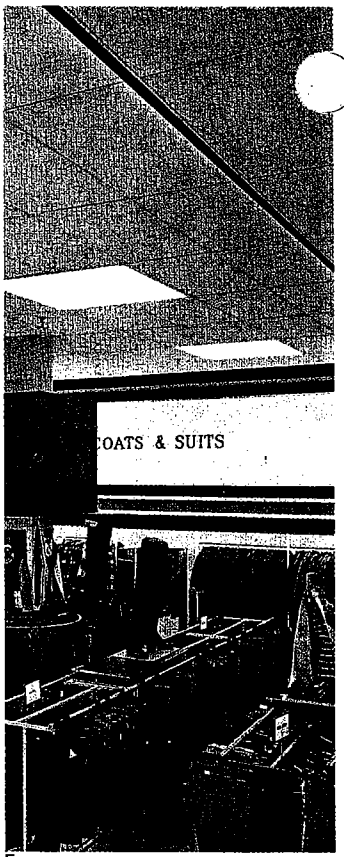
C



D



E



F

A. Regency ceiling
B. Ceramic ceiling
C. Regency ceiling
D. Rock Face (Reveal) ceiling
E. Natural Fissured ceiling
F. 1201 Air Bar

The performance data herein reflects Conwed's expectation based on tests conducted in accordance with ASTM, ABPA, and other recognized standard methods.

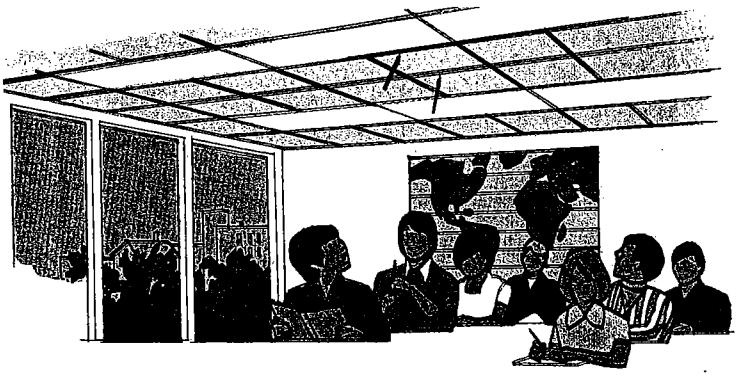
By presentation of this data, Conwed makes no express warranties concerning the characteristics, properties, availability or performance of these products, and specifically disclaims any implied warranties. This includes any warranty of merchantability or fitness for any particular purpose.

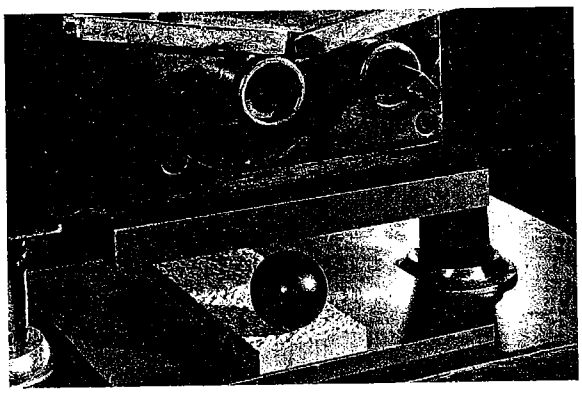
No agent, employee, or representative of Conwed is authorized to modify this disclaimer.

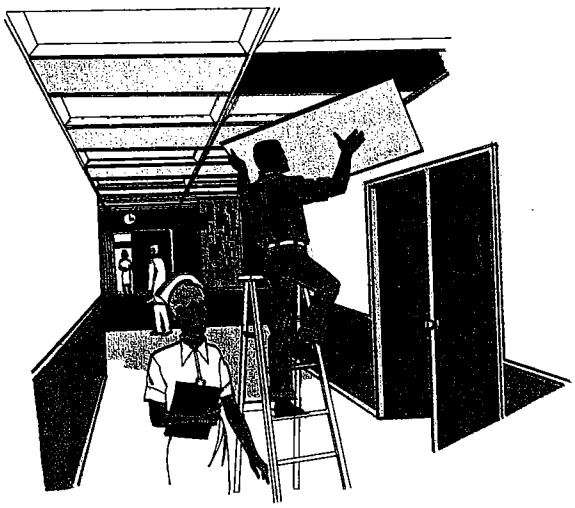
The case for abuse resistant ceilings in new installations and renovations.

Rock Face Ceilings are the solution wherever abuse is a problem: in schools, hospitals, churches, recreation centers, and main lobbies. Ceilings do get bumped by mop handles or ladders . . . scuffed by jumping kids or flying books . . . cracked or chipped during routine plenum maintenance. Rock Face panels minimize the damage potential, providing long-term savings.

When ceilings are noticeably scraped or scuffed, they've taken some abuse. New ceilings will get the same rough treatment. Make sure they can take it.



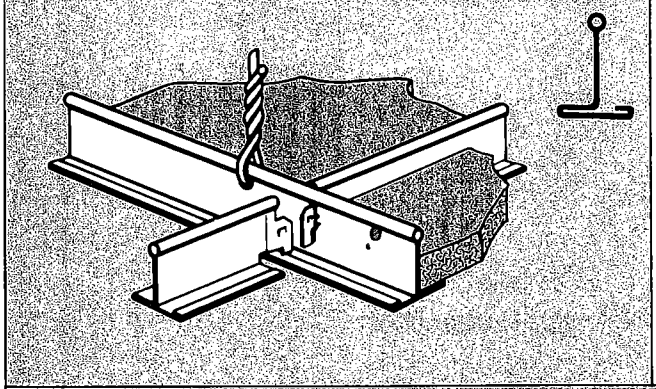




The hardness quality of the Rock Face surface is measured by the "ball hardness test." Rock Face tolerated an average resistance to surface deformation of 150 pounds using a 2 inch steel sphere. (ASTM C-637)

STANDARD PRODUCTS
SUSPENSION

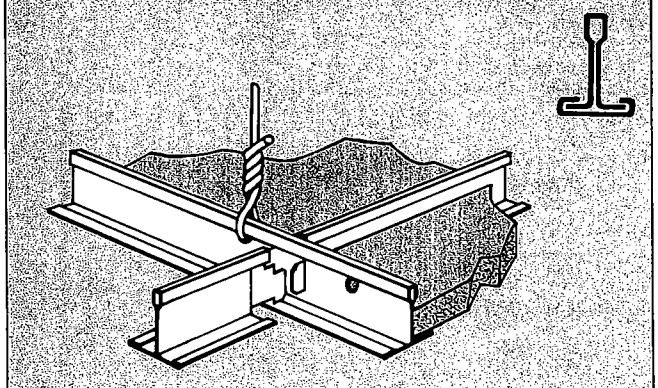
500 Series Snap-Grid® Exposed System



This widely used system features a choice of single or double web cross tees with identical locking devices at each end for ease of installation. Locking ends protect against lateral pull out yet permit removal for relocation at any time.

The single web (500 series) has a $^{15}/_{16}$" white face and cross tee slots 6" o.c. The double web has a 1" face with cross tee slots 12" o.c. Double web choices are white (530 series), black (580 series), aluminum cap (540 series); also available in walnut (570 series), and gold (590 series) on special order.

800 Series Exposed Grid System

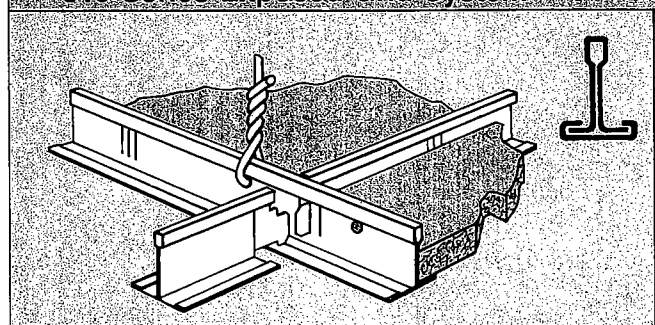


The 800 series features a $^{15}/_{16}$" face, double web construction and rectangular bulb design. The cross tee locking tabs prevent lateral pull out yet permit easy relocation. Choices include white face cappings (800, 810, and 811 series) aluminum caps and finish (840 series), walnut facings (870 series), and black facings (880 series).

An all aluminum (830 series) system provides resistance to corrosion caused by moisture and most chemical vapors. This series is particularly desirable for areas such as swimming pools and kitchens.

Where the suspension system must have a low light reflectance a special low gloss finish is provided in the 1911 series.

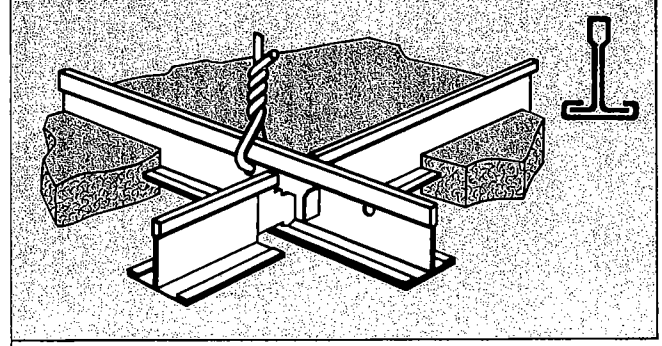
818 Series Exposed Grid System



Components of this exposed system offer all the features of the 800 series, plus greater flexibility for 60" x 60" modules.

Cross tee slots are placed in groups of three 2" o.c. every 10" along 10' main runners, and 10" o.c. from both ends of the 5' cross tees. This allows reversal of module direction and 60" x 20" openings.

444 Series Concealed Accessible System



Downward as well as upward access is available for concealed tile with the 444 system. Downward access is gained by opening the access components downward with an Access key, and removing those tile.

For direct access without an Access key, replace concealed cross tees at desired locations with downward access tees and angles, or upward top and bottom access angles. System rigidity and proper spacing is maintained by incorporating one of the following methods at least every four to six feet:

1. Locking concealed cross tees.
2. #826 spacer bars which lock onto the main runner bulbs.
3. #431 spacer clips which lock concealed cross tees together.

EXHIBIT E
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

Rapid Lighting Design and Cost Estimating

A HANDY, QUICK METHOD FOR LIGHTING DESIGN AND CALCULATION OF INSTALLATION PRICES

Prafulla C. Sorcar, P. E.

McGraw-Hill Book Company New York St. Louis San Francisco Auckland Bogotá Düsseldorf Johannesburg London Madrid Mexico Montreal New Delhi Panama Paris São Paulo Tokyo Singapore Sydney Toronto

Library of Congress Cataloging in Publication Data

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Includes index.
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TK4169.S64 621.32'2 79-4690
ISBN 0-07-059651-4

1 2 3 4 5 6 7 8 9 0 HDHD 7 8 6 5 4 3 2 1 0 9

The editors for this book were Tyler G. Hicks and Carolyn Nagy, the designer was Naomi Auerbach, and the production supervisor was Sally Fliess. It was set in Times Roman Italic by Florence Lanaro.

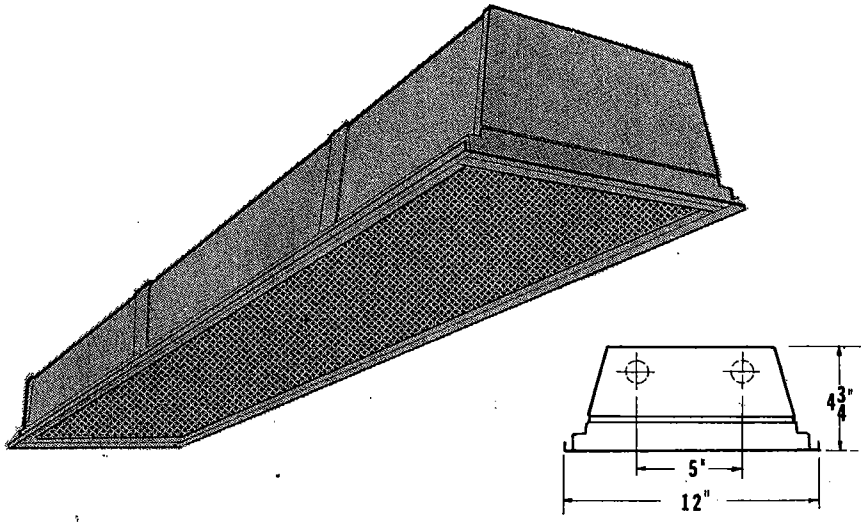
It was printed and bound by Halliday Lithograph.

Recessed Fluorescent Troffers

B

3

5



B-2

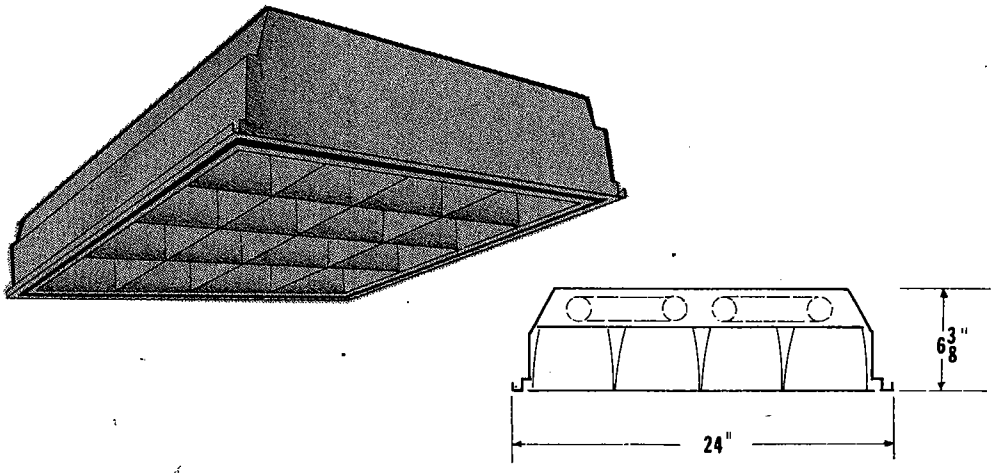
Description	1- X 4-ft troffer
Lamps	Two F40 T12, 3200 lm each, 20,000 h
Lens	Acrylic prismatic lens
Spacing ratio	1.1
Visual comfort probability	62 (length)/61 (cross)
Maintenance factors	0.75/0.70/0.65
Conversion factors	A. Unit with two F40 T12 lamps = 1.0 B. Unit with three F40 T12 lamps= 1.5

COST DETAILS PER LUMINAIRE

Type of unit	Input, W	Contractor's price		Installed cost	
		Grid	Flange	Grid	Flange
A	93	$44	$45	$74.75	$77.75
B	146	54	55	90	92.75

The installed cost includes published contractor's book price for the luminaire with lens and ballast, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. *See page B–52 to add a luminaire outlet recessed above ceiling.*

1- X 4-ft troffers are used mostly in corridors, between aisles, and in library stack areas.



B-16

Description	2- X 2-ft parabolic-louvered troffer
Lamps	Two F40/U T12, 3025 lm each, 12,000 h
Louvers	Parabolic reflector cells of specular anodized aluminum
Spacing ratio	1.3
Visual comfort probability	92 (length)/91 (cross)
Maintenance factors	0.90/0.85/0.80
Input, W	93

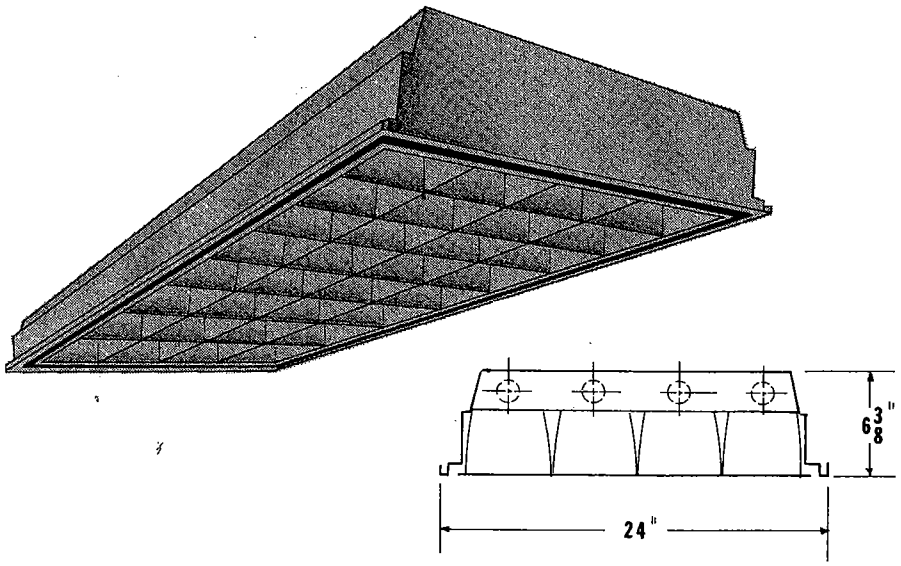
COST DETAILS PER LUMINAIRE

Type of unit	Contractor's price	Installed cost
Grid	$65	$ 99
Flange	76	114.25

The installed cost includes published contractor's book price for the luminaire with louvers and ballast, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. See paeg B–52 to add a luminaire outlet recessed above ceiling.

This handsome unit, with deep parabolic reflector cells of specular anodized aluminum, provides illumination with low apparent brightness. Open louvers, having no static charge and no dirt- or grime-collecting surfaces, assure high maintenance factors.

B-20



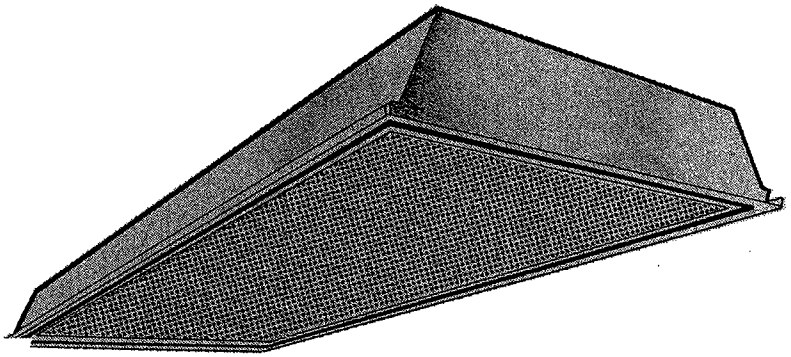
Description	2- X 4-ft parabolic louvered troffer
Lamps	Four F40 T12, 3200 lm each, 20,000 h
Louvers	Parabolic reflector cells of specular anodized aluminum
Spacing ratio	1.3
Visual comfort probability	90 (length)/91 (cross)
Maintenance factors	0.90/0.85/0.80
Input, W	186

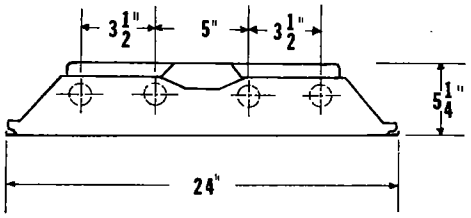
COST DETAILS PER LUMINAIRE

Type of unit	Contractor's price	Installed cost
Grid	$ 95	$143.25
Flange	107	159

The installed cost includes published contractor's book price for the luminaire with louvers and ballasts, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. See page B-52 to add a luminaire outlet recessed above ceiling.

This handsome unit, with deep parabolic cells of specular anodized aluminum, provides illumination with low apparent brightness. Open louvers, having no static charge and no dirt- or grime-collecting surfaces, assure high maintenance factors.





Description	2- X 4-ft troffer with Day-Brite VIP lens
Lamps	Four F40 T12, 3200 lm each, 20,000 h
Lens	Day-Brite VIP lens
Spacing ratio	1.77
Visual comfort probability	53 (length)/52 (cross)
Maintenance factors	0.75/0.70/0.65
Input, W	186

COST DETAILS PER LUMINAIRE

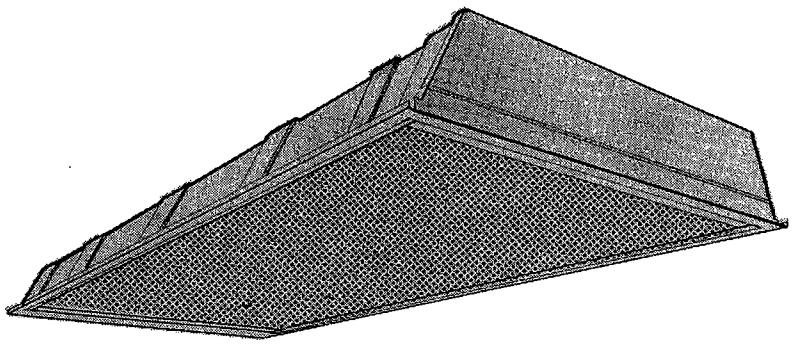
Type of unit	Contractor's price	Installed cost
Grid	$82	$127.50
Flange	89	136.75

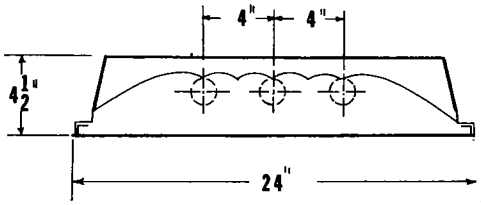
The installed cost includes published contractor's book price for the luminaire with lens and ballasts, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. See page B-52 to add a luminaire outlet above ceiling.

Luminaires with this special diffusing medium provide uniform lighting with extra-widespread distribution. These luminaires are widely used in office buildings.

The reference luminaire is as manufactured by Day-Brite, Mobilex unit.

This information was based on test 6289, prepared by Day-Brite Lighting Division, Emerson Electric.





Description	2- X 4-ft troffer (Gibson EE system)
Lamps	Three F40 T12, 3200 lm each, 20,000 h
Lens	Gibson EE lens
Reflector	Specular anodized aluminum
Spacing ratio	1.7
Visual comfort probability	56 (length)/47 (cross)
Maintenance factors	0.75/0.70/0.65
Input, W	146

COST DETAILS PER LUMINAIRE

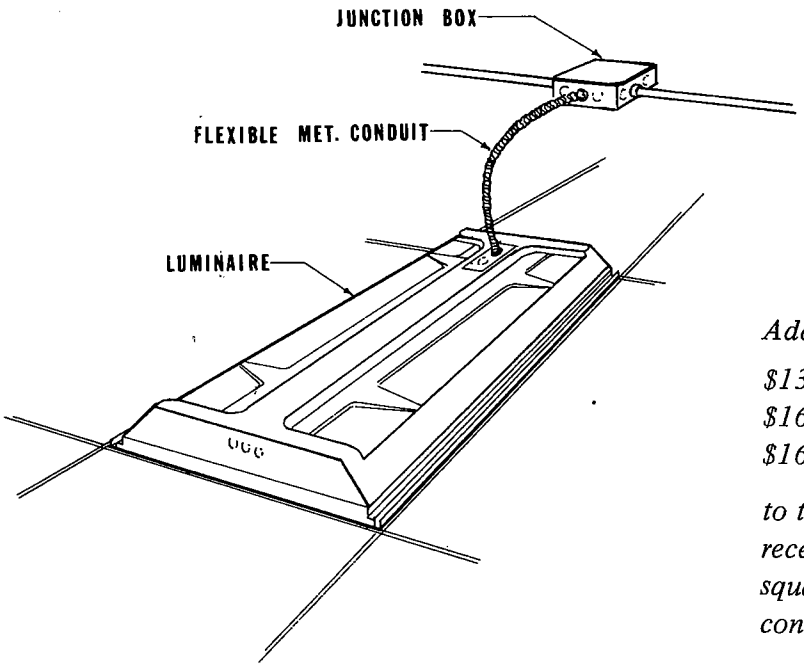
Type of unit	Contractor's price	Installed cost
Grid	$ 96	$141.50
Flange	103	152

The installed cost includes published contractor's book price for the luminaire with lens and ballasts, number of lamps as shown, luminaire fastening devices, 6-ft length of 3/8-in flexible metallic conduit with two 7-ft lengths of no. 12 AF wire, two connectors, and the labor required for recess mounting and connection of the luminaire. *See page B–52 to add a luminaire outlet recessed above ceiling.*

Luminaires with this special reflecting surface and the diffusing medium provide uniform illumination with extra-widespread distribution. These luminaires are widely used in institutions and office buildings.

This information was based on ERL report 2134, prepared for Gibson Lighting, Americus, Georgia.

INSTALLED COST OF OUTLETS ABOVE CEILING



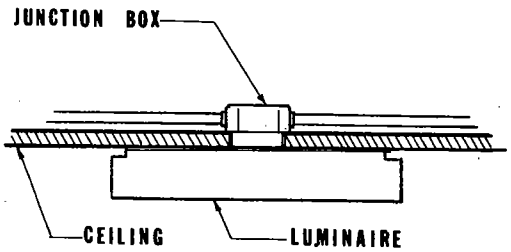
B-52

Add

$13.25 for EMT terminal
$16.70 for GRC terminal
$16.70 for IMS terminal

to the luminaire installed cost for an outlet recessed above ceiling, which includes a 4-in square box, blank cover, bar hanger, two connectors for conduit, and two wire nuts.

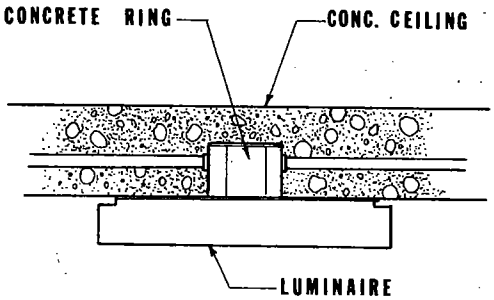
INSTALLED COST OF FLUSH-MOUNTED OUTLETS



Add

$12.88 for EMT terminal
16.38 for GRC terminal
16.38 for IMS terminal

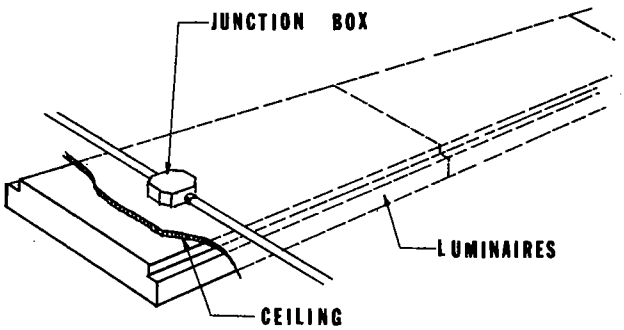
to the luminaire installed cost for an outlet flush-mounted to a suspended or furred ceiling, which includes a 4-in octagon box, adjustable bar hanger, two connectors, plaster ring, and two wire nuts.



Add

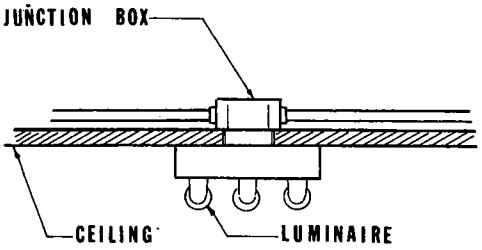
$12.18 for EMT terminal
15.84 for GRC terminal
15.84 for IMS terminal

to the luminaire installed cost for an outlet flush-pan- or deck-mounted in concrete, which includes a 4-in concrete ring, connectors for the type of conduit required, cover plate, and two wire nuts.



In a series of luminaire connections as on the left, where all luminaires are internally connected and only one outlet is required for service entrance, add all individual luminaire installed costs and one outlet installed cost as necessary, as shown above.

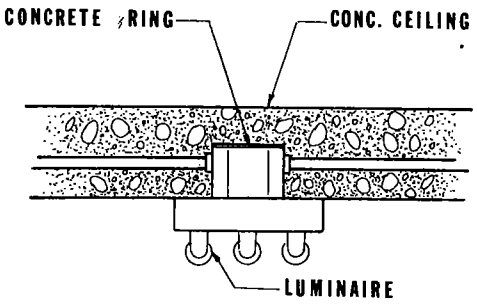
Direct-mount



Add

$12.88 for EMT terminal
16.38 for GRC terminal
16.38 for IMS terminal

to the luminaire installed cost for an outlet flush-mounted to a suspended or furred ceiling, which includes a 4-in octagon box, adjustable bar hanger, two connectors, plaster ring, and two wire nuts.

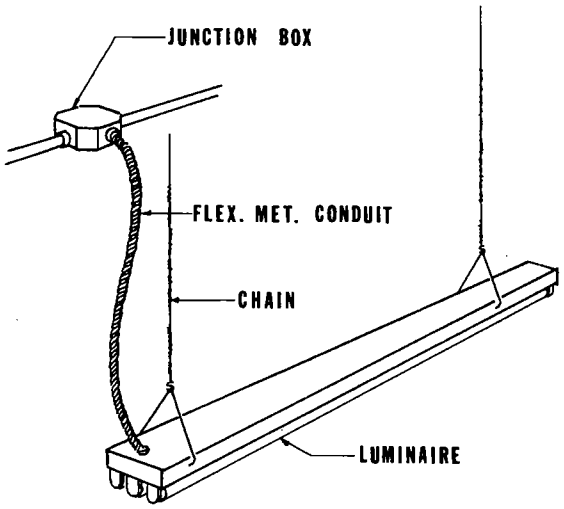


Add

$12.18 for EMT terminal
15.84 for GRC terminal
15.84 for IMS terminal

to the luminaire installed cost for an outlet flush-pan- or deck-mounted in concrete, which includes a 4-in concrete ring, connectors for the type of conduit required, cover plate, and two wire nuts.

Chain-suspended



Add

$4.50 for each chain suspension which includes a 3-ft chain, two S hooks, and a Y hook. Add $0.50 for each additional 1-ft length of chain.

For a surface-mounted outlet to feed the chain-suspended luminaire add as shown below:

Type terminal	Type of construction		
	Steel	Wood	Concrete
EMT	13.78	$13.60	$16.33
GRC	18.88	18.70	21.43
IMS	18.88	18.70	21.43

This includes an octagon outlet box with a 6-ft length of flexible metallic conduit having 8-ft long 2 no. 12 AF wire, two connectors, and two wire nuts.

EXHIBIT F
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

The Optical Design of Reflectors

WILLIAM B. ELMER

SECOND EDITION

John Wiley & Sons, New York/Chichester/Brisbane/Toronto

Library of Congress Cataloging in Publication Data:

Elmer, William B
The optical design of reflectors.

(Wiley series in pure and applied optics)
Bibliography: p.
Includes index.
1. Reflectors, Lighting—Design and construction.
2. Reflection (Optics) I. Title.

TH7970.R4E37 1979 621.32'2 79-14206
ISBN 0-471-05310-4

Printed in the United States of America

10 9 8 7 6 5 4 3 2

is available to the reflector
al softening of the striations
it images or reflector surface
spread out a sharp peak of
n which case radial circular

conical peens will give better
tern. Radial V-grooves with
symmetric street light reflec-
ux through the lamp stem or
preciably. Oval peens have
tangential directions, and to
; compound curvatures. The
gonal radii calculated on the

in radius of curvature of a
can be appropriately grad-
npracticable to make peens
er or much larger than 0.150
approaching these values, it
eters in judiciously selected
he tooling of a reflector has
innumerable times.

pressed to find a quick and
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hemical or electrochemical
ding, or other improvised
ith the possible exception of
rue spreading, although ac-
sually with severe losses in
ot (without cracked pieces)
essures used in shotblasting
rface which are folded by
Sandblasting usually leaves
bedded in the metal or plas-

s a microscopic roughening
isfactory results like those
which destroys most of the

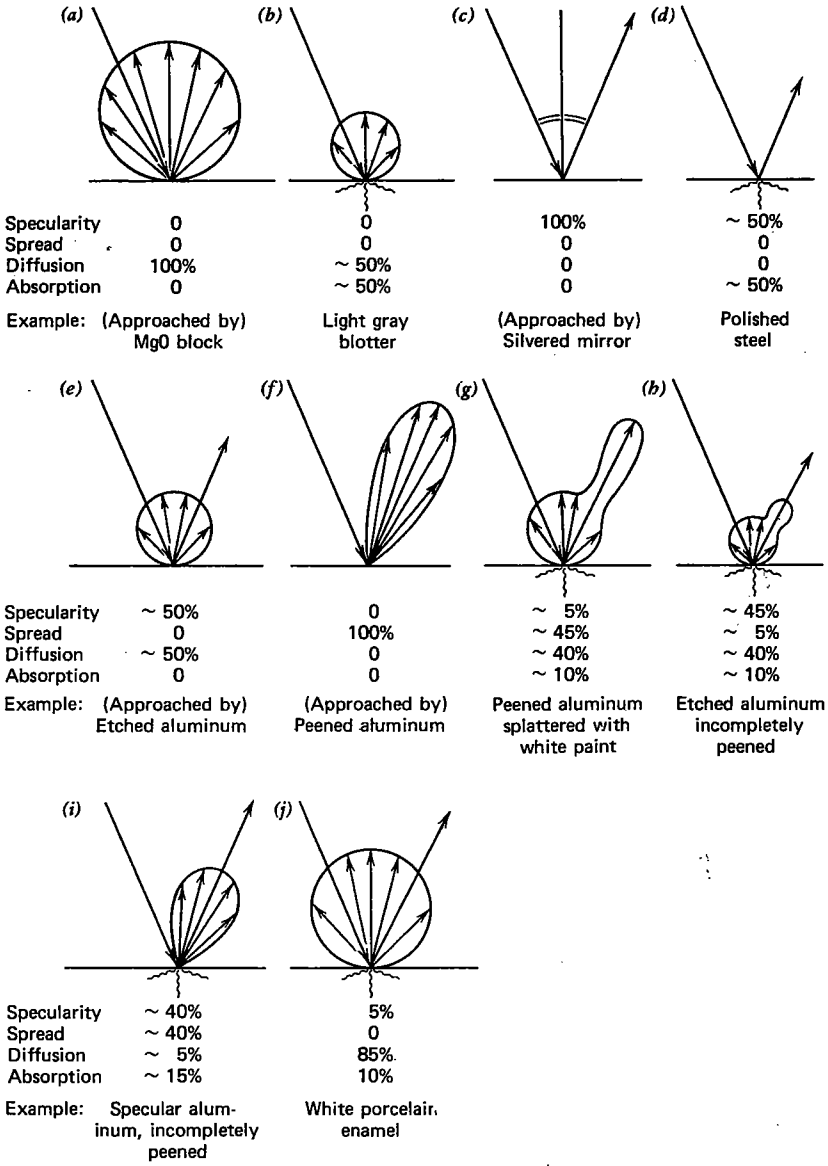

Figure 9. Varieties of reflector characteristics.

EXHIBIT G
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

8TH EDITION

LIGHTING HANDBOOK

REFERENCE & APPLICATION

MARK S. REA, PH.D. FIES
EDITOR-IN-CHIEF
RENSSELAER POLYTECHNIC INSTITUTE

ILLUMINATING ENGINEERING SOCIETY OF NORTH AMERICA
NEW YORK

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The Illuminating Engineering Society of North America welcomes your comments. Please send all correspondence to:

Publications Department
IESNA
120 Wall Street, 17th Floor
New York, NY 10005

light may be used. The luminance of luminaires and nearby surroundings should be less than 310 cd/m^2 (30 cd/ft^2) as seen from the patient's bed or any normal reading position.

Luminaires to meet these conditions should have low luminance. One or more such luminaires in a single- or multiple-occupancy room may be needed to provide general lighting 760 mm (30 in.) above the floor for normal use. To prevent excessive spottiness of general lighting, the installation should provide a lighting level ratio of not more than 1:5 on a horizontal plane 760 mm (30 in.) above the floor within a radial distance of 2.4 m (8 ft) from the point of maximum illuminance on that plane.

Observation of Patients. Provision should be made for local low-level illumination of a color quality that will allow for proper diagnosis of the patient's appearance. There should be lighting at each bed and its floor area so that the nurse can frequently observe the patient and equipment, such as drainage tubes and containers, during the night, with minimum disturbance to patients. This light should be switched at the door, and may also be controlled by a dimmer. When the observation lighting must be left on all night, or when higher levels are needed, temporary screening from other patients may be necessary.

NIGHT LIGHTING. Wall-bracket combination lighting units for patients' use frequently incorporate a night light with switch at the bed. Such a light is desirable for occasional use by patient or nurse; however, when left on continuously, its luminance in the surrounding field of darkness is sometimes a source of annoyance to patients wishing to sleep.

For continuous use, the night light recommended incorporates a low-brightness luminaire with louvered or refractive cover, flush wall type, installed so that its center is approximately 360 mm (14 in.) above the floor, to direct a low illuminance along the floor where it is needed for moving about the room.

For night lighting it is most important to limit the source luminance. This luminance should not exceed 70 cd/m^2 (6.5 cd/ft^2) for continuous use, or 200 cd/m^2 (19 cd/ft^2) for a short time.

EXAMINATION LIGHTING. The lighting for *examining* patients in their rooms should be of a color quality that will not distort skin or tissue color, of a directionality to permit careful inspection of surfaces and cavities, and shadowless. When curtains are used to isolate a patient, others in the room are protected from the examining lamp; however, whether fixed or portable, the examination lighting should be confined to the bed area and provide adequate lighting over a circular area 0.6 m (2 ft) in diameter.

Examination lights are defined as those luminaires used for minor medical procedures outside the operating room. Examples of these procedures are tissue examination and suture removal. Examination/treatment units range from a simple gooseneck lamp to a luminaire similar to an operating room unit, depending on the complexity and nature of the visual task. The following criteria should be considered when selecting luminaires for examination:

1. *Distance.* Adequate illumination should be available at a distance of 1070 mm (42 in.). In treatment rooms, the focal length of the luminaire should be compatible with the task to be observed, typically 600–910 mm (24–36 in.).
2. *Radiation.* For patient safety and comfort, the luminaire should be designed with a heat filtration system. At maximum intensity, the lighting unit at a distance of 1060 mm (42 in.) from the field should produce no more than 25,000 μW/cm^2 in the field.
3. *Color Correction.* The luminaire should provide good color rendering of tissue. The color temperature should be between 3500 and 6700 K.
4. *Mobility.* The unit should move freely and be easily positioned with one hand. Once the luminaire is positioned, the mounting system should permit it to remain stationary without drifting. Articulation of the unit should require 23 kg (5 lb) or less of force by the user.
5. *Safety.* Safety of the user and patient should be addressed by considering (a) the surface temperatures of the luminaire, (b) the tipping hazard, (c) electrical safety and (d) the durability of external surfaces. The placement of fixed, flexible arm units should be reviewed carefully, especially with older patients who may reach out to use the arm for support, which it will not provide.

Patient Use. Patient use implies control by the patient for reading, visiting, self-care or viewing television. This control must be limited to prevent annoyance to other patients.

The reading light should provide light at the normal reading position, assumed to be 1140 mm (45 in.) above the floor. To allow the patient freedom to turn in bed without moving out of the reading light zone, the area of the reading plane (lighted by an adjustable unit) should be approximately 0.3 m^2 (3 ft^2), and for a nonadjustable unit the area should be approximately 0.7 m^2 (6 ft^2). To provide a reasonable degree of uniformity of light over these recommended areas, the lighting level at the outer edge of each area should not be less than two-thirds of the lighting level at the center. To provide comfortable lighting conditions for reading, the luminance in candelas per square meter on the ceiling, provided by some means of general

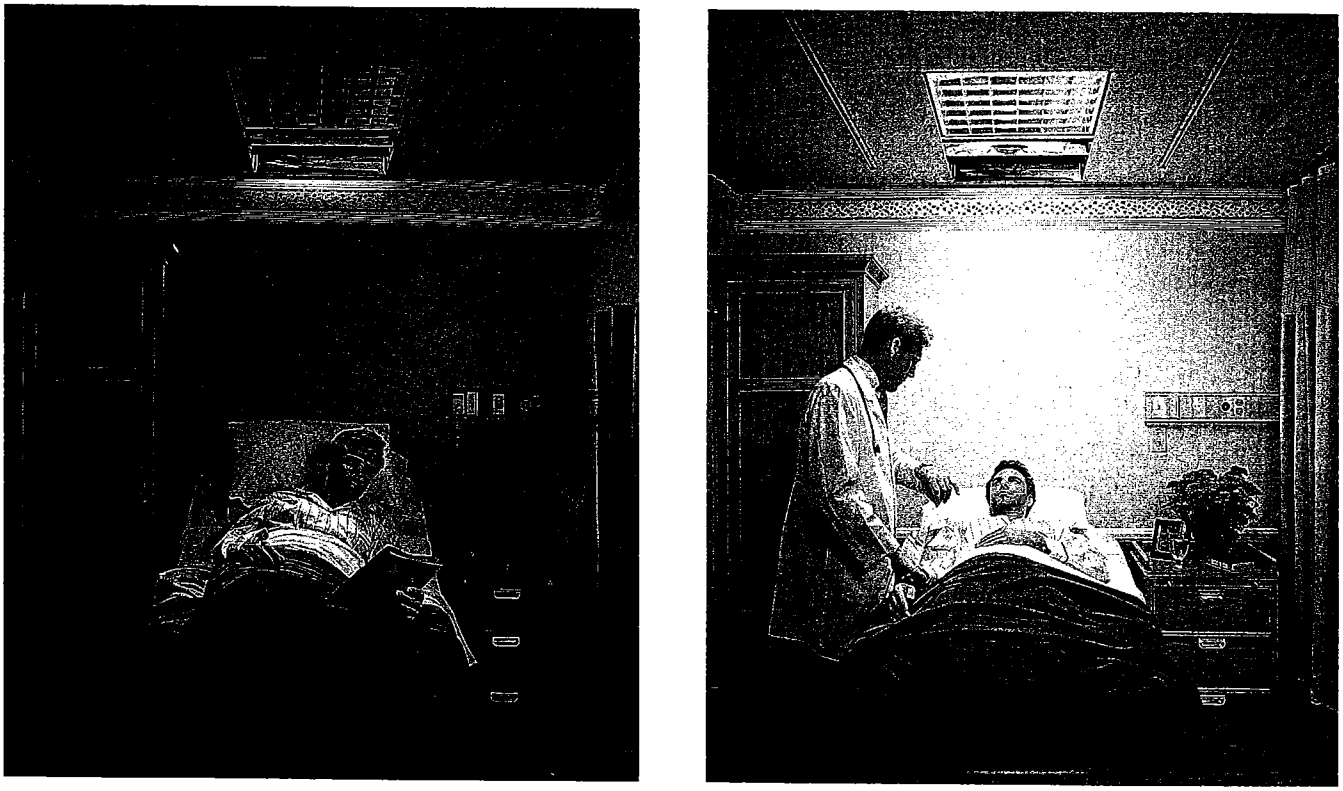

Fig. 17-7. Patient room lighting. Left: Reading light, which positions light directly onto the patient's reading material with no reflected glare. Right: Examination light, which can be controlled with a wall switch by hospital staff, utilizes compact fluorescent lamps for excellent color rendition.

lighting, should be at least equal to the illuminance in 1/p lux on the reading matter.

The luminance of the reading lamp and of any surface illuminated by it, as seen from the patient's bed or any normal reading position, should be less than 310 cd/m^2 (30 cd/ft^2). This condition is admittedly difficult to satisfy and entails a careful choice of luminaire and built-in limitations to its movement. See figure 17-7.

Housekeeping. A very important consideration is the lighting for housekeeping functions. Housekeepers need to see dust or dirt to remove it, including that beneath the furniture. Oblique lighting should be provided over horizontal surfaces to observe dust.

Nursing Stations. In most hospitals a nursing unit is coordinated around a nursing station (see figure 17-8). Here charts are stored, read and written. A desk or shelf is invariably provided, usually against some type of counter or below a hung cabinet. Lighting mounted beneath this counter should provide for the task. It should be so arranged that it supplements the overall illumination of the station.

Some of this lighting will be in continuous use, night and day, and this should be considered in the lighting plan for the station. Usually, although by no means universally, when the nursing station is not visible from any of the patient accommodations, general ceiling

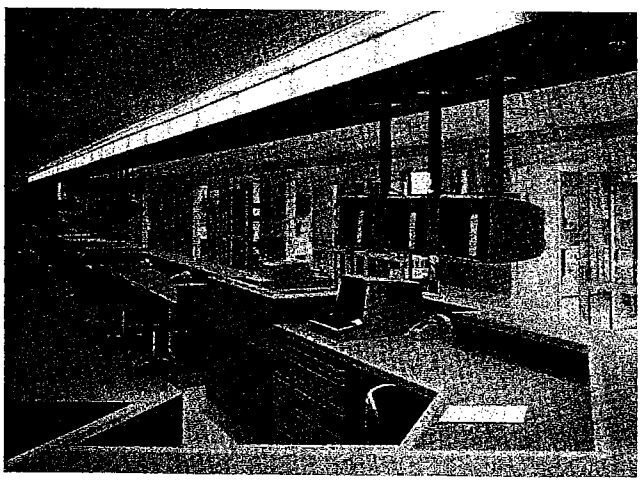

Fig. 17-8. Lighting at a nurses' station is multilevel, to allow for a higher illumination during the day and a lower level at night. The lighting is designed to allow for the critical task of reading patient information from the computer screen. Undercounter task lights also function as night lights.

sources remain lighted during the night hours. Also the luminaires beneath counters, placed so that a person sitting at the desk is shielded from glare, should not be within the patient's direct view.

As the nurse must make frequent trips from the station to patient's rooms as well as to service loca-

EXHIBIT H
TO REBUTTAL STATEMENT
OF THOMAS LEMONS

IES LIGHTING HANDBOOK

1987 Application Volume

JOHN E. KAUFMAN, PE, FIES
Editor

JACK F. CHRISTENSEN
Associate Editor

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by patient or nurse; however, when left on continuously, the luminance produced in the surrounding field of darkness is sometimes a source of annoyance to patients wishing to sleep.

For continuous use, the night-light recommended incorporates a low-brightness luminaire with louvered or refractive cover, flush wall type, installed so that its center is approximately 360 millimeters (14 inches) above the floor to direct a low illuminance along the floor where it is needed for walking or moving about in the room.

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Examination lights are defined as those luminaires used for minor medical procedures outside the operating room. Examples of these procedures would be tissue examination and suture removal. The range of examination/treatment units varies from a simple "gooseneck" lamp to a luminaire having qualities similar to an operating room unit, depending on the complexity and nature of the visual task. The following criteria should be considered when selecting luminaires for examination:

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2. *Radiation:* for patient safety and comfort, the luminaire should be designed with a heat filtration system. At maximum intensity, the lighting unit at a distance of 1060 millimeters (42 inches) from the field should produce no more than 25,000 microwatts per square centimeter in the field.

3. *Color Correction:* the luminaire should provide good color rendition of tissue. Color temperature should be between 3500 and 6700 kelvins.

4. *Mobility:* the unit should move freely and be easily positioned with one hand. Once the luminaire is positioned, the mounting system should permit it to remain stationary without drifting. Articulation of the unit should require 2.3 kilograms [five pounds] or less of force by the user.

5. *Safety:* safety of the user and patient should be addressed by considering (a) surface temperatures of the luminaire, (b) tipping-hazard, (c) electrical safety, and (d) durability of external surfaces. The placement of fixed, flexible arm units should be reviewed carefully, especially with older patients who may reach out to use the arm for support, which it will not provide.

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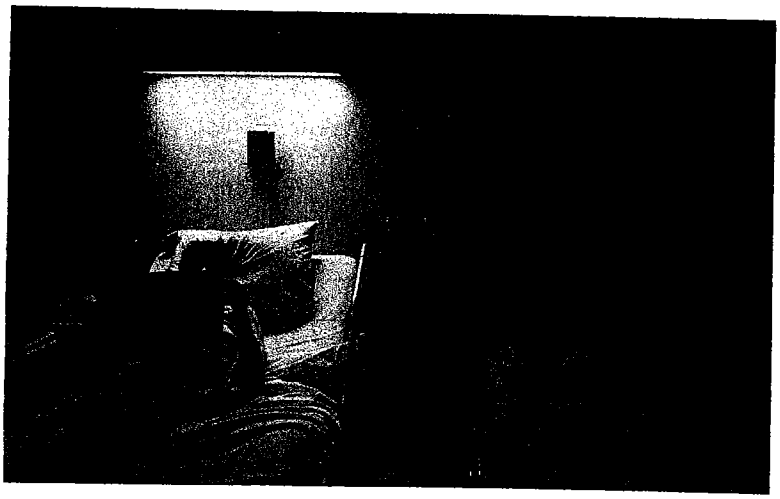


Fig. 7-6. Patient room lighting in multiple occupancy accommodation. Note one patient reading while another sleeps under reduced illumination.

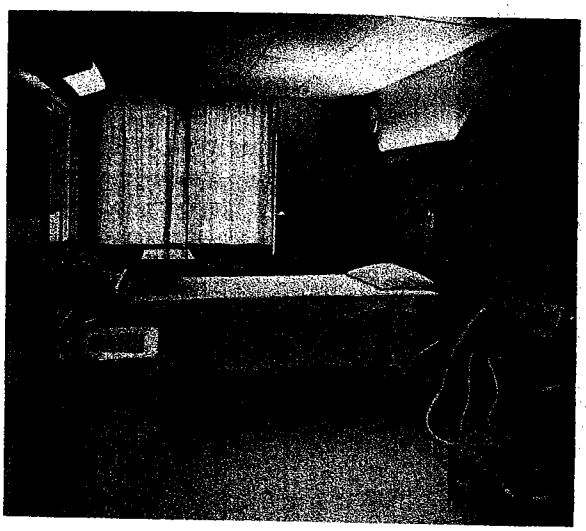


Fig. 7-8. Critical care room. Wall brackets contain two fluorescent lamps for indirect general lighting, one fluorescent lamp as a downlight for reading, and an incandescent night-light for surveillance from the nurses' station. Two 325-watt tungsten halogen lamps in ellipsoidal reflectors are also provided for indirect examination light.

port resuscitation, hemorrhage, or any other anticipated emergency situations which can be anticipated.

The illumination should enable the observer to note (1) changes in contour and color, (2) the prominence of veins on the neck, and (3) the presence of yellow tints in the patients' eyes, if possible. Good color rendering is important so that the patients' complexion will have a true appearance. Thus, only improved color fluorescent lamps should be used. See Fig. 7-8.

While the demands for visual tasks in these units may be great, the well-being of the patient must also be carefully considered in planning. For example, the minimum requirements of construction from the Health Resources Administration (*79-1450*) require the provision of windows to enable *each* patient to be cognizant of the outdoor environment. Yet the provision of illumination by this means is not important.

The general lighting should be capable of being dimmed. It should be located so that neither the prone patient, nor the one sitting with an elevated backrest, will be subjected to glare. In addition to general lighting, there should be lighting for examinations by the physician. Also, some type of surgical task light should be readily available to provide higher illuminances for emergency procedures.

Most of these facilities contain a handwashing area.

The nursing station is usually fully visible to the patient, so that luminaires below the counter or shelf should be shielded.

Monitoring devices (see Fig 7-9) should be studied so that there will be adequate illumination for reading them. This also includes a review of their placement and whether or not they are internally illuminated.

Children's Section (Pediatric). The child admitted to the hospital for the first time may feel dwarfed by its huge size and depressed by the concentration of suffering. Strange equipment may be frightening and may alarm ill patients or intensify anxiety. For this reason the pediatric section or department should be provided with

Fig. 7-9. Nursing station in critical care unit. Note the lighting beneath the counter and out of the patient's view. Also, monitoring devices are easily visible.

EXHIBIT 2

31 Fed.Appx. 650, 2002 WL 410485 (C.A.Fed.)
(Cite as: 31 Fed.Appx. 650)

H

Briefs and Other Related Documents

This case was not selected for publication in the Federal Reporter.NOTE: Pursuant to Fed.Cir.R. 47.6, this order is not citable as precedent. It is public record. Please use FIND to look at the applicable circuit court rule before citing this opinion. Federal Circuit Rule 47.6. (FIND CTAF Rule 47.6.)

United States Court of Appeals,Federal Circuit.

BAKER HUGHES, INC., and Baker Hughes Oilfield Operations, Inc., Plaintiffs-Appellees,

v.

DAVIS-LYNCH, INC., Defendant-Appellant.

No. 01-1377.

DECIDED: March 15, 2002.

Owner of patent for inflatable bore-hole packer with grit-like material on mandrel sued competitor for infringement. The United States District Court for the Southern District of Texas granted summary judgment for owner on issue of patent's validity, and appeal was taken. The Court of Appeals, Clevenger, Circuit Judge, held that: (1) patent was not indefinite, but (2) fact issues existed as to whether patent was invalid for obviousness or under on-sale bar.

Affirmed in part, vacated in part and remanded.

West Headnotes

[1] Patents 291 ⚿99

291 Patents
291IV Applications and Proceedings Thereon
291k99 k. Description of Invention in Specification. Most Cited Cases

Specification for inflatable bore-hole packer patent included sufficient structure for claimed "inflation means" to avoid finding of invalidity on ground of indefiniteness; "inflatable packer" referred to in specification was device well known in art, and thus was sufficient to inform one of ordinary skill in art of necessary accompanying structure to carry out inflation means. 35 U.S.C.A. § 112.

[2] Federal Civil Procedure 170A ⚿2508

170A Federal Civil Procedure
170AXVII Judgment
170AXVII(C) Summary Judgment
170AXVII(C)2 Particular Cases
170Ak2508 k. Patent Cases. Most Cited Cases

Issue of material fact as to whether inflatable bore-hole packer patent's use of grit-like material on mandrel to reduce slippage was obvious in light of prior art precluded summary judgment on invalidity claim. 35 U.S.C.A. § 103.

[3] Patents 291 ⚿76

291 Patents
291II Patentability
291II(E) Prior Public Use or Sale
291k76 k. What Constitutes Public Sale. Most Cited Cases

On-sale bar to patentability is triggered by use, sale, or offer for sale of subject matter which fully anticipated claimed invention or would have rendered claimed invention obvious by its addition to prior art; sale of complete invention is not required. 35 U.S.C.A. § 102(b).

[4] Federal Civil Procedure 170A ⚿2508

170A Federal Civil Procedure
170AXVII Judgment
170AXVII(C) Summary Judgment
170AXVII(C)2 Particular Cases
170Ak2508 k. Patent Cases. Most Cited Cases

Issue of material fact as to whether patentee sold inflatable bore-hole packer with grit-like material on mandrel more than one year before patent application date precluded summary judgment on

31 Fed.Appx. 650, 2002 WL 410485 (C.A.Fed.)
(Cite as: 31 Fed.Appx. 650)

claim patent was invalid under on-sale bar. 35 U.S.C.A. § 102(b).

Before CLEVENGER, RADER, and BRYSON, Circuit Judges.

CLEVENGER, Circuit Judge.

**1 Davis-Lynch, Inc., appeals from a decision of the United States District Court for the Southern District of Texas granting summary judgment for Baker Hughes, Inc., and Baker Hughes Oilfield Operations, Inc., denying Davis-Lynch's patent defenses of obviousness, on-sale bar, and claim indefiniteness. See *Baker Hughes, Inc. v. Davis-Lynch, Inc.,* No. H-97-2905 (S.D. Tex. June 22, 2000) (memorandum order granting summary judgment). The district court's determination that the claims are not indefinite is correct, but the denial of Davis' obviousness and on-sale bar challenges is not. We thus *affirm* the district court's decision as to indefiniteness, but *vacate* the decision as to the obviousness and on-sale bar defenses, *remanding* these issues for trial.

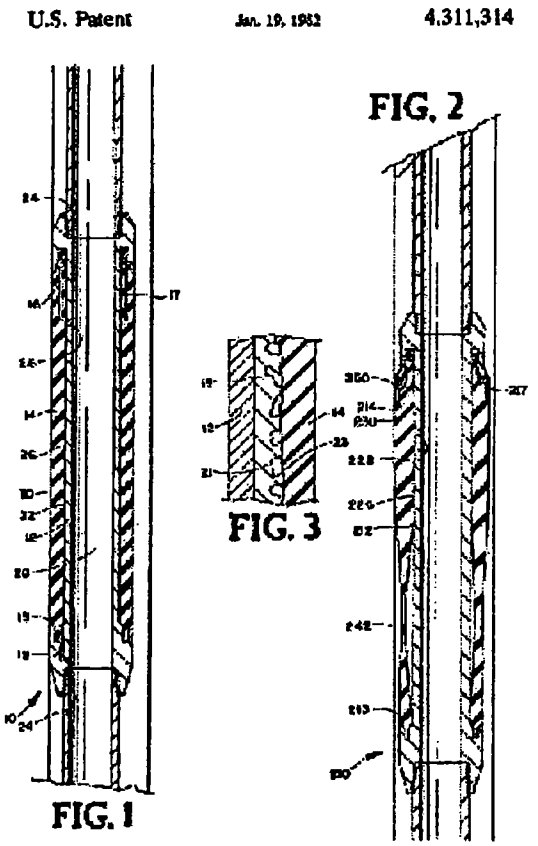
I

Baker Hughes, Inc., and Baker Hughes Oilfield Operations, Inc. (collectively "Baker") have sued Davis-Lynch, Inc. ("Davis") on U.S. Patent No. 4,311,314 (the " '314 patent") directed to a "Well Packer."

During the drilling of oil and gas wells, it is often desirable to seal off the surrounding borehold from the pipe itself. This isolates the pipe from oil, gas, or water in the surrounding earth. As the '314 patent discloses, inflatable packers are well known in the art for accomplishing this function. '314 patent , col. 1, lines 5-21.

The '314 patent describes just such an inflatable packer. As Figure 1 of the '314 patent shows, it consists of a pipe (12), known in the art as a " mandrel," which fits down the borehole. An elastic sheath, or "sleeve," is attached to and surrounds the mandrel as it is installed. Once the mandrel reaches the bottom of the borehole, liquid cement flows down the center of the mandrel, exiting through passageway 18. Trapped between the surrounding sleeve and the outside of the mandrel, the liquid cement fills up the space between the mandrel and the borehole, expanding back up the length of the mandrel until the sleeve is completely compressed against the borehole wall. The cement sets, and the seal is made.

*652



As Baker concedes, this technology is not new. However, operation of inflatable packers posed certain problems, particularly when installing longer lengths of pipe. As the mandrel slid down the borehole, the uninflated sleeve had a tendency to

catch on the walls of the borehole. This often caused the sleeve to be pulled upwards, thus tearing it away from the mandrel and destroying its utility.

The '314 patent offers a solution to this problem. The patent claims an inflatable packer with a grit-like substance bonded to the outer surface of the mandrel, underneath the sleeve. This increases the coefficient of friction between the mandrel and the inside of the sleeve. As a result, when the outside of the sleeve contacts the borehole wall during installation, it is more likely that the sleeve will be pulled down with the mandrel rather than catching on the wall. As a result, the risk of tearing is reduced.

****2** The '314 patent consists of one independent claim and two dependent claims. Only the first claim is relevant. It recites:

An inflatable packer for use within the borehole of an oil well comprising:
1) a centrally disposed tubular mandrel provided with end means for sealably attaching to a string of pipe;
2) a tubular sleeve formed from a suitable elastomer and positioned around the mandrel, the mandrel extending out of the ends of the sleeve;
3) the ends of the sleeve being sealably attached to the periphery of the mandrel;
***653** 4) the sleeve having a first position wherein the sleeve inner surface is in contact with the outer surface of the mandrel;
5) means to inflate the sleeve so as to expand the sleeve to a second position so as to seal the sleeve against the borehole;
6) the outer surface of the mandrel in contact with the sleeve when the sleeve is in the first position, being provided with a coating of grit-like particles bonded to said outer surface to prevent the sleeve from sliding axially along the mandrel when the sleeve is in the first position.

'314 patent, col. 4, lines 19-35.

The '314 patent was filed November 20, 1980, and issued on January 19, 1982, with George Suman listed as the inventor. The patent was initially assigned to Completion Tool Company ("CTC"). CTC was acquired by Baker in 1995. Baker subsequently sued Davis for infringement of the '314 patent.

Before the district court, Davis moved for summary judgment of invalidity based on its obviousness, indefiniteness, and on-sale bar defenses. Baker cross-moved for summary judgment on the indefiniteness and on-sale bar issues, but not on obviousness. Baker also moved for partial summary judgment of infringement.

The court granted Baker's motion on the indefiniteness and on-sale bar issues, granted Baker partial summary judgment as to infringement, and denied Davis's motions on invalidity. The court's order is unclear, and the parties dispute, whether summary judgment was granted for Baker as to obviousness.

The parties subsequently signed a joint pretrial order designating damages and willfulness as the sole issues remaining for trial. The court held an eight-day trial, resulting in a finding of willful infringement and an award of $1,267,232 in damages. The district court subsequently trebled the damages to $3,801,696, awarded Baker $630,026 in prejudgment interest and $815,441 in attorney's fees and costs, for a total award of more than $5 million.

Davis appeals the grant of summary judgment denying its obviousness, on-sale bar, and indefiniteness defenses. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

II

Summary judgment is appropriate if there is no genuine issue of material fact. Fed.R.Civ.P. 56(c); *Anderson v. Liberty Lobby, Inc.* 477 U.S. 242, 247-48, 106 S.Ct. 2505, 91 L.Ed.2d 202 (1986). We review the district court's decision to grant summary judgment *de novo,* drawing all reasonable inferences in favor of the nonmovant. *Id.* at 255.

Claim Indefiniteness

31 Fed.Appx. 650, 2002 WL 410485 (C.A.Fed.)
(Cite as: 31 Fed.Appx. 650)

**3 [1] Under 35 U.S.C. § 112 ¶ 6, a patentee may define structure generically through a means expression, provided that the specification discloses sufficient structure corresponding to that means. Failure to disclose adequate structure renders the patent invalid as indefinite under section 112 ¶ 2. *Kemco Sales, Inc. v. Control Papers Co.*, 208 F.3d 1352, 1360-61, 54 USPQ2d 1308, 1313 (Fed.Cir.2000). Whether a claim has indeed failed to disclose sufficient structure, and is thus indefinite, is a question of law which we review *de novo*. *S3, Inc. v. nVIDIA Corp.*, 259 F.3d 1364, 1367, 59 USPQ2d 1745, 1746 (Fed.Cir.2001); *Cybor Corp. v. FAS Techs., Inc.*, 138 F.3d 1448, 1455, 46 USPQ2d 1169, 1174 (Fed.Cir.1998) (*en banc*). We have specifically rejected the contention that this process involves underlying issues of fact. *654*Exxon Research and Eng'g Co. v. United States*, 265 F.3d 1371, 1376, 60 USPQ2d 1272, 1276-77 (Fed.Cir.2001).

At issue is the means function of claim 1, which recites "a means to inflate the sleeve so as to expand the sleeve to a second position so as to seal the sleeve against the borehole." '314 patent, col. 4, lines 28-30. The specification discloses a "port 18 to provide for the communication of fluid from bore 20 of mandrel 12 into the annular space 22 formed between the mandrel and sleeve when the packer is inflated." *Id.* at col. 2, lines 54-57. The specification also generally refers to the invention as an "inflatable packer," and notes that "inflatable rubber sleeve type packers have been used for many years in relatively short lengths." *Id.* at col. 1, lines 16-17. No other structure is disclosed.

As the district court correctly noted, the specification's description of the port represents a significant disclosure of structure necessary for the purpose of inflating the sleeve. Indeed, without this port, inflation could not take place. However, the port is not sufficient structure in and of itself to accomplish the function of inflating the sleeve, as required by the claim. The district court's claim construction implicitly recognizes this by calling for the presence of a valve structure in addition to the disclosed port.

Under our caselaw interpreting section 112 ¶ 6, knowledge of one skilled in the art can be called upon to flesh out a particular structural reference in the specification for the purpose of meeting the statutory requirement of definiteness. *Budde v. Harley-Davidson, Inc.*, 250 F.3d 1369, 1382, 58 USPQ2d 1801, 1810-11 (Fed.Cir.2001) (holding the specification's reference to "commercially available vacuum sensors" constituted sufficient structure, as one skilled in the art would have understood the reference); *Atmel Corp. v. Info. Storage Devices, Inc.*, 198 F.3d 1374, 1382, 53 USPQ2d 1225, 1229-31 (Fed.Cir.1999) (holding that the district court "should have determined whether sufficient structure was disclosed in the specification based on the understanding of one skilled in the art"); *S3*, 259 F.3d at 1370, 59 USPQ2d at 1749-50 (holding that the specification's reference to a "selector" sufficed as one skilled in the art would have understood the term).

**4 It is not evident that the mere existence of the port indicates to one skilled in the art the remaining structure necessary to perform the "inflation means." For this reason, even under the legal principles discussed above, this bare disclosure might not suffice to bring in the required outside knowledge to flesh out the disclosure. However, the specification's continual references to an "inflatable packer" do. The claim's usage of the term " inflatable packer," a term well known in the art, informs one of ordinary skill in the art of the necessary accompanying structure to carry out the inflation means, specifically, the valve system. Indeed, Davis's expert and counsel conceded this point during deposition and oral argument, respectively.

Since the specification discloses sufficient structure to meet the requirements of section 112 ¶ 2, the claim is not indefinite. The district court's grant of summary judgment in favor of Baker on this issue is affirmed.

Obviousness

On appeal, Baker asserts that Davis waived the issue of obviousness by failing to designate it as an issue remaining for trial, as instructed by the judge

in the memorandum and order disposing of the various motions. As Baker notes, under governing Fifth Circuit law, the failure of a party to include a claim or issue in a pretrial order constitutes waiver. ***655***Kona Tech. Corp. v. S. Pac. Transp. Co.,* 225 F.3d 595, 604 (5th Cir.2000). Davis asserts that the court indeed did grant summary judgment as to obviousness.

The district court's opinion on this point is not perfectly clear. The order itself merely states that Davis's motion for summary judgment on invalidity is denied, and adds that "it appears to the Court that the only remaining issue for trial is infringement under the doctrine of equivalents." Other language from court's opinion does appear to indicate that the court granted summary judgment on the obviousness claim, stating:
With respect to the [sic] Davis' claims of patent invalidity based on lack of enablement, indefiniteness, on sale bar, obviousness and laches, the Court has thoroughly reviewed the applicable law and the record.... The Court concludes that Baker is entitled to summary judgment as a matter of law on Davis' failure to prove the requisite elements of its defenses of lack of enablement, indefiniteness, on sale bar, obviousness and laches.

The body of the district court's opinion does not clearly reveal whether the court granted summary judgment that the claims are not obvious. Pages 27-29 and 42-50 of the district court's opinion contain the relevant discussion, but it is unclear to what extent the court is reciting the arguments made by the parties as opposed to making factual determinations of its own.

However, the district court's April 17, 2001, order granting fees, costs, and enhanced damages does clearly state that:
on June 22, 2000, the Court entered a Memorandum and Order of Partial Summary Judgment.... That Order also denied Davis-Lynch's Motion for Summary Judgment on Invalidity and Laches, and granted Baker's Cross-Motion for Partial Summary Judgment, and "*held as a matter of law* that the '314 patent claims were not invalid for indefiniteness or lack of enablement, that the patent claims were not invalid under the on sale bar, *that the patent claims were not invalid for obviousness,* and that laches does not apply." [Emphases added.]

****5** Thus, as of April 17, 2001, the district court itself was of the impression that it had granted summary judgment against Davis as to obviousness. Indeed, Baker had the same view, as the language quoted above appears to come directly from Baker's proposed judgment. As a result, we think it appropriate to read the district court's opinion as granting summary judgment in favor of Baker that the claims were not obvious.

[2] Such a determination cannot stand in light of the record. Both documentary evidence and expert testimony exist for the proposition that the use of " grit-like" material was known in the inflatable packer field for the purpose of reducing slippage. Although somewhat conclusory, the affidavit submitted by Davis's expert witness, Dr. Joel Hebert, does reference both U.S. Patent No. 3,085,627 and the Lymes literature. Both of these disclose the use of friction areas on the *outside* of a packer to avoid slippage in a borehole which is relatively smooth. Additionally, there is expert testimony that the use of friction to reduce slippage was well known in the field of packers. This is particularly relevant since, as the district court noted, Baker has conceded that it is precisely the use of friction-enhancing "grit-like" substances which renders the invention patentable. Thus, while the record evidence may not conclusively establish the obviousness of the '314 invention, it does suffice to raise a triable issue of material fact.

***656** As a result, the district court's decision granting summary judgment in favor of Baker as to obviousness is vacated and remanded for trial.

On-Sale Bar

Before the district court, Davis introduced both expert testimony, the Ivy and Trefney affidavits, and documentary evidence in support of its contention that activities prior to the critical on-sale bar date of November 20, 1979, render the '314

patent invalid.

Davis has introduced sales reports, obtained from Baker during discovery, indicating CTC sales in December 1978, January 1979, and March 1979 to Kirby Exploration. Ivy, a former employee of Kirby, alleged sales during these months of CTC inflatable packers containing mandrels coated with " Ruff-Kote." These reports also indicate sales to Mesa Petroleum in October 1979. Trefney, a former employee of CTC, alleged that he assembled inflatable packers coated with "Ruff-cote" in October 1979 for sales to Mesa Petroleum.

Davis has also introduced a CTC document, dated 1994, which states that CTC contracted out the manufacture of its packers in 1977, "shortly thereafter" and "during this initial period of field installations" learned of design problems that included "rubber sliding up the mandrel during run in." The CTC solution was to "place a patented rough coating on the mandrel."

Davis has further submitted a document titled "Tool Company History," also obtained from Baker in discovery, which includes the phrases "serious problem with 'bunching' during running," "initial use of Ruff-Kote," and "develop Ruff-Kote procedures" in an entry for 1979. In Davis's deposition of Mr. Suman, the inventor of the '314 patent, Mr. Suman testified that he thought he might have made the document in 1984.

****6** The district court determined that the above evidence was insufficient to withstand Baker's motion for summary judgment. In particular, the district court found that the above evidence did not tend to show that the *complete* invention, embodying each of the claims of the '314 patent, was on-sale prior to the critical date. In addition, the district court found the two oral affidavits insufficiently corroborated, assigning them little if any weight. With respect to Davis's documentary evidence, the district court found it of limited probative value, noting that the sales reports did not indicate whether the products sold were packers, and that the "Tool Company History" document failed to indicate whether the claimed use occurred before the on-sale bar date, or whether a packer was even involved.

[3] As the district court correctly noted, the on-sale bar inquiry is governed by our decisions in *Ferag AG v. Quipp, Inc.,* 45 F.3d 1562, 33 USPQ2d 1512 (Fed.Cir.1995) and *Atlantic Thermoplastics Co. v. Faytex Corp.,* 970 F.2d 834, 23 USPQ2d 1481 (Fed.Cir.1992). However, contrary to the district court's opinion, these cases do not limit the application of the on-sale bar to the use, sale, or offer for sale of a *complete* invention. Indeed, as stated in *Ferag AG,* the on-sale bar is triggered by the use, sale, or offer for sale of subject matter which "fully anticipated the claimed invention *or would have rendered the claimed invention obvious by its addition to the prior art." Ferag AG,* 45 F.3d at 1566, 33 USPQ2d at 1514 (quoting *UMC Elec. Co. v. United States,* 816 F.2d 647, 656, 2 USPQ2d 1465, 1472 (Fed.Cir.1987)) (emphasis added); *accord STX LLC v. Brine Inc.,* 211 F.3d 588, 590 (Fed.Cir.2000); *Tec Air, Inc. v. Denso Mfg. Mich., Inc.,* 192 F.3d 1353, 1358, 52 USPQ2d 1294, 1296 (Fed.Cir.1999).

***657** [4] Here, as the district court noted, Baker has conceded it is precisely the claim element reciting " grit-like particles" on the mandrel that made the invention claimed in the '314 patent patentable over the prior art. The Ivy and Trefney affidavits submitted by Davis allege that CTC inflatable packers were sold prior to the on-sale bar date with a mandrel coated with a gritty substance known as " Ruff-cote." They are thus eminently probative and should be given their full evidentiary weight.

The district court's second rationale for limiting the weight assigned to Davis's proffered affidavits hinges upon our caselaw requirement of corroboration. On appeal, Davis has attempted to portray the district court's opinion as improperly introducing a *per se* rule that two affidavits cannot corroborate each other. This, of course, would be incorrect under the "rule of reason" used to evaluate such evidence, as well as our explicit statements allowing for oral corroboration. *Sandt Tech., Ltd. v. Resco Metal and Plastics Corp.,* 264 F.3d 1344, 1350-51, 60 USPQ2d 1091, 1094-95 (Fed.Cir.2001) . However, the district court's citation of the Supreme Court's decision in the *The Barbed-Wire*

Patent, 143 U.S. 275, 12 S.Ct. 443, 36 L.Ed. 154 (1892), and its assessment of all Davis's proffered documentary evidence lend themselves to the conclusion that the district court did not apply a *per se* rule. Rather, the district court indeed considered all of Davis's evidence, but determined that it failed the "rule of reason" test.

**7 Our caselaw does favor the use of documentary evidence to corroborate oral testimony. *Sandt,* 264 F.3d at 1350-51, 60 USPQ2d at 1094. However, as "all pertinent evidence" is examined to determine whether the story is credible, circumstantial and oral evidence may also be employed. *Id.* Under *Woodland Trust v. Flowertree Nursery, Inc.,* 148 F.3d 1368, 47 U.S.P.Q.2d 1363 (Fed.Cir.1998), oral corroboration is evaluated for a number of factors, including the extent, details, and contradiction or impeachment of the witnesses' testimony. *Id.* at 1371, 47 USPQ2d at 1366.

Here, Davis has presented two affidavits from noninterested third parties that bear precisely on the critical aspect of the '314 invention, the use of a grit-like substance on the mandrel of an inflatable packer. The dates on the sales reports correspond precisely with those alleged in the Ivy and Trefney affidavits, while the CTC document appears to detail the use of "Ruff-Kote" on the mandrel consistent with the affidavits. Moreover, Davis has introduced documentary evidence from the inventor himself purporting to show the use of "Ruff-Kote" during 1979. The fact that this document generally refers to the use of "Ruff-Kote" during that year, but does not indicate whether it took place in the last 40 days of that year-after the critical on-sale bar date of November 20, 1979-does not vitiate its use as corroborative evidence.

On appeal, Baker has attacked the documentary evidence as non-contemporaneous with the alleged events, thus attempting to downplay its probative value. Baker overstates the importance of this factor in this case. Here, the documentary evidence offered is not Davis's own documents, but rather those of CTC, Baker, and Suman. The risk of litigation-inspired fabrication is thus limited.

Considering all the pertinent evidence, we find that Davis has offered sufficient, corroborated evidence to create a triable issue of material fact as to whether the '314 patent has been rendered invalid by application of the on-sale bar. The district court's decision granting of summary judgment for Baker on this issue is therefore vacated.

*658 CONCLUSION

The district court correctly determined that the claims of the '314 patent are not indefinite under section 112 ¶ 2. We thus affirm the entry of summary judgment for Baker on that issue. However, as the district court's decision to grant summary judgment for Baker on the obviousness and on-sale bar defenses was in error, we vacate the portions of the district court decision dealing with these issues and remand the case for further proceedings not inconsistent with our decision.

COSTS

No costs.

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- 2001 WL 34610285 (Appellate Brief) Brief for Plaintiffs-Appellees (Sep. 17, 2001) Original Image of this Document (PDF)
- 2001 WL 34607523 (Appellate Brief) Brief for Defendant-Appellant Davis-Lynch, Inc. (Aug. 06, 2001) Original Image of this Document with Appendix (PDF)
- 01-1377 (Docket) (May. 29, 2001)

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